Missouri Department of Natural Resources

Second Annual Report
Fiscal 1976
July 1, 1975-June 30, 1976

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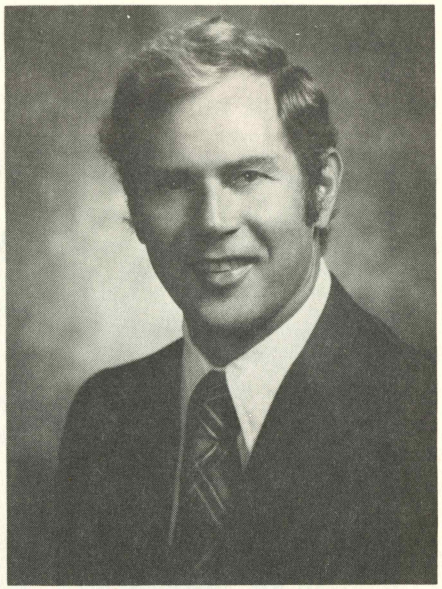
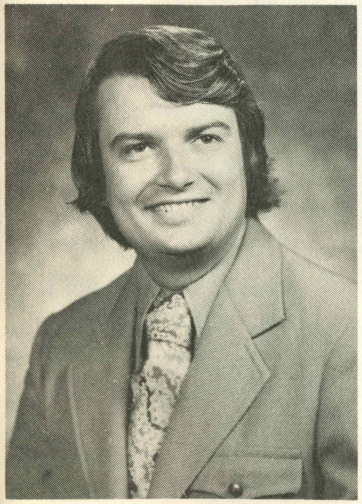
CHRISTOPHER S. BOND
Governor

Missouri

Department of Natural Resources

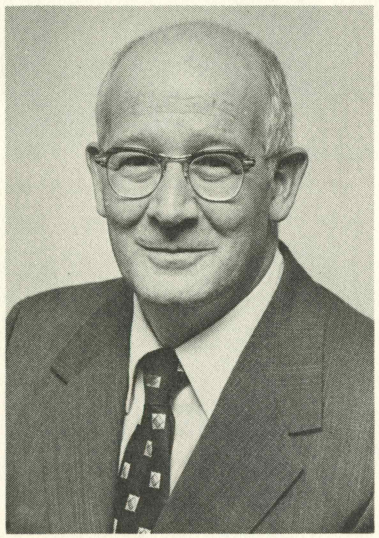


JAMES L. WILSON
Director

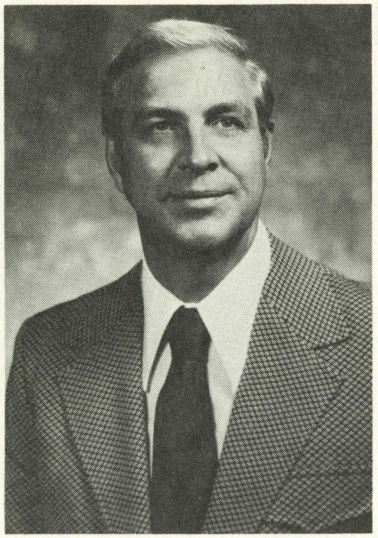


KENNETH M. KARCH
Deputy Director
Director, Division of
Environmental Quality

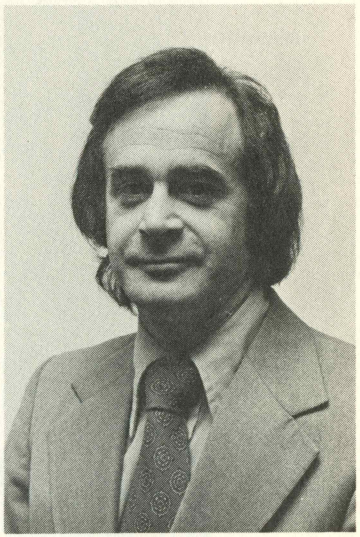
WILLIAM K. WIGHT
Director, Division of
Parks and Recreation



WALLACE B. HOWE
State Geologist and Director,
Division of Geology and Land Survey



ROBERT G. HAAKE
Director, Division of
Administrative Services



MARVIN J. NODIFF
Director, Division of
Planning and Policy Development

INTRODUCTION

TO: Governor Christopher S. Bond and Members, Missouri General Assembly

Missourians can be proud of the achievements attained by the Missouri Department of Natural Resources (DNR) set forth in this, our second annual report.

In an age when development and preservation must be reconciled by sound judgment and bold leadership, our young and aggressive department has exemplified these qualities in meeting its responsibility to protect Missouri's rich legacy of natural resources.

Among the highlights of fiscal year 1976, June 1, 1975 through June 30, 1976, are these:

OUTDOOR RECREATION

- DNR added the second largest park to the Missouri state park system with the 8,500-acre tract donated to the state by St. Joe Minerals Corp., one of the largest donations of land ever made to the state by a private corporation;
- Dedicated the $1 million Jacob L. Babler Outdoor Recreation Center for the Handicapped at Dr. Edmund A. Babler Memorial State Park;
- Completed a comprehensive State Trails Plan and embarked upon the most extensive trails development in the history of the Missouri state parks system;
- Guided the establishment of the Meramec River Recreation Area;
- Continued to support for public use and enjoyment the vast and beautiful Weldon Springs property near St. Louis;
- Administered $4 million in federal grants for nearly 100 outdoor recreation projects in Missouri communities, counties and school districts.

HISTORIC PRESERVATION

- DNR took the lead in renovating Jefferson Landing State Historic Site in Missouri's capital city as the state's official American Revolution Bicentennial project.
- Added 13 sites to the prestigious National Register of Historic Places.

ENERGY

- DNR established a professionally-staffed program to coordinate and emphasize the state's activities in energy conservation and increased utilization of Missouri coal;
- Undertook an extensive research of the heavy oil potential of tar sands in southwestern Missouri;
- Conducted the first three statewide seminars in energy management for Missouri hospitals, schools and physical plant administrators;
- Held major public hearings in St. Louis and Kansas City on the state's first energy conservation plan;
- Conducted the first statewide survey of interruptible natural gas customers to determine natural gas supplies available in the winter of 1975.

MINERALS

- DNR brought together the world's leading geologists for the first symposium on the lead-rich Viburnum Trend in southeast Missouri.
- Tabulated Missouri's 1975 mineral production value — the second highest on record with a production of $672.3 million.

WATER

- DNR began the first statewide comprehensive water plan since 1939;
- Developed and completed federally-required plans for control of specific sources of water pollution in the eight river basins of the state;
- Administered federal and state grants totaling $188 million for construction of wastewater treatment facilities for Missouri communities and sewer districts;
- Administered $3 million in state grants for public water supply and wastewater collection systems throughout Missouri;
- Assumed responsibility for meeting requirements for Missouri of the federal Safe Drinking Water Act, the nation's first comprehensive standards for drinking water.

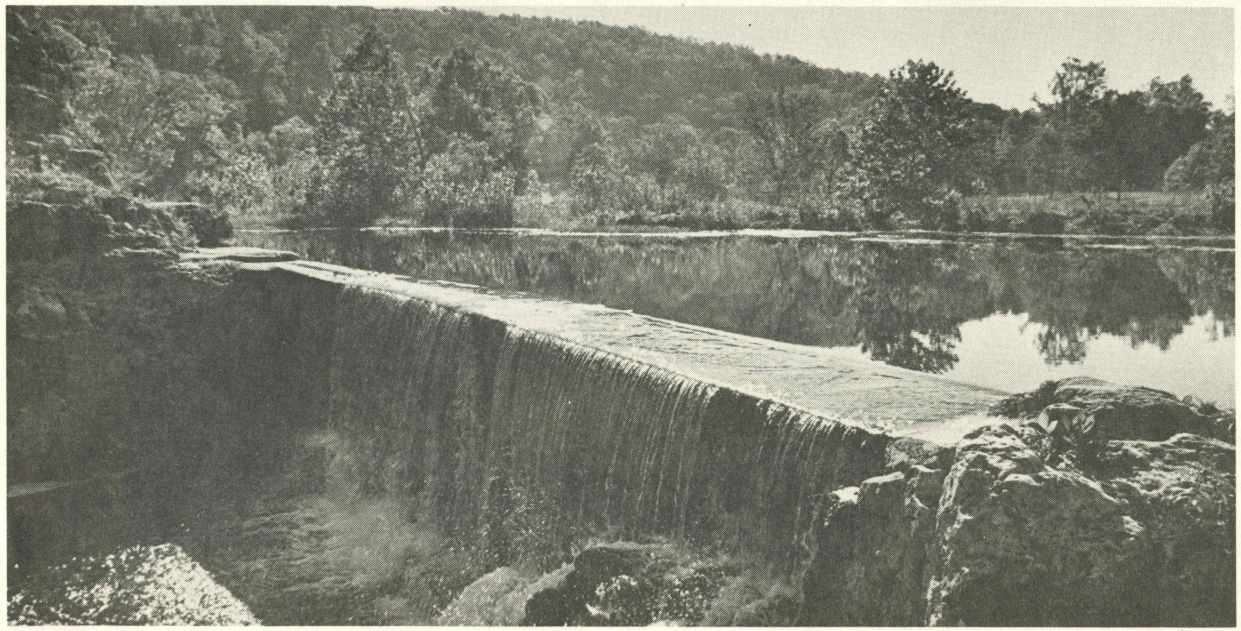
AIR

- Developed plans to curb automobile-induced air pollution for the St. Louis area through a traffic control plan;
- Developed initial plans to control emissions of particulates and sulfur dioxide in St. Louis, and particulates in Kansas City to attain national air quality standards in these two metropolitan areas;

LAND

- DNR sponsored the tar sands bill which became law in June 1976, requiring permits for companies which mine tar sands to reclaim them for future use;
- Administered the revised solid waste management law passed by the General Assembly in 1975;
- Assisted in formation of the nation's first industrial waste exchange in St. Louis;
- Established soil and water conservation districts in two additional counties, Atchison and Andrew, in a continuing effort to emphasize good land management practices in agriculture;
- Indexed almost 100,000 land surveys for the land survey records repository — first microfilm repository of its kind in the nation;
- Remonumented and restored land survey corners which provide basic boundary controls for all real property in Missouri.

DNR has moved decisively to insure that present and future generations will continue to experience a quality environment.



Internally, we have embarked upon a management efficiency program, "Management by Objectives," whereby supervisors and employees jointly agree upon departmental objectives or goals, define their responsibilities in terms of expected results, and then measure the end results to determine how well the objectives are met.

We have completed cross-training education for personnel in the environmental quality areas, and conducted a communications workshop for our clerical staff members to assist them in improving their ability to communicate with each other, with supervisors and the general public.

The department values the loyal service of members of the policy-making commissions assigned to our department: the Air Conservation, Clean Water, Land Reclamation, Soil and Water Districts Commissions; Oil and Gas Council, and State Inter-Agency Council for Outdoor Recreation. Their policies are carried out by our professional staff.

Likewise, we value the wide experience and guidance brought to bear by members of our advisory Missouri Energy Council, State Park Board, Advisory Council on Historic Preservation, Lewis and Clark Trail Committee, and Thomas Hart Benton Memorial Homestead Commission.

DNR is involved in the major issues of the day — dealing with sensitive areas affecting Missouri's future from wilderness protection to the development of mineral resources and future energy supplies, while insuring the protection of our environment.

This report speaks to the progress we have made during FY 1976, our second year.

JAMES L. WILSON
Director
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

OFFICE OF THE DIRECTOR

Public Information Program

The department's public information program is centralized within the Office of the Director to promote close coordination and communication between the director and the information services staff. Working under the direction of a professional information supervisor, the staff is responsible for keeping Missouri taxpayers informed about all department programs and activities.

The information staff writes and distributes news releases to all Missouri newspapers, radio and television stations, and produces a monthly tabloid offset newspaper called "Missouri's Environment" distributed to all news media and departmental employees, and on request to schools, colleges, libraries, environmental organizations, engineers, geologists, parks and recreation organizations and the general public.

In-house information services supplied by this staff include answering public inquiries for information numbering more than 200 per month; production of departmental photographs, slide-tape programs, radio and television public service spots; coordinating environmental education efforts for the department, and producing all departmental annual reports, brochures and pamphlets which are free to the public on request.

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Budget for Personal Services, Equipment Purchase and Repair, and Operations

	Fiscal Year 1976	Fiscal Year 1975
Departmental Administration		
Office of the Director	**78,817**	74,771
Administrative Services	**245,882**	229,217
Planning and Policy Development	**509,353**	312,137
TOTAL	**833,992**	616,125
Environmental Quality		
Administration and General Support	**51,061**	48,332
Water Quality Program	**466,404**	501,757
Air Quality Program	**386,632**	294,754
Public Water Supply	**153,311**	153,899
Solid Waste Management	**148,817**	108,015
Laboratory Services	**296,037**	252,140
Regional Office Program	**876,088**	653,964
Land Reclamation	**49,251**	52,297
Soil and Water Districts	**378,530**	358,680
TOTAL	**2,806,131**	2,423,838
Geology and Land Survey		
Administration and General Support	**275,886**	288,620
Geological Survey	**502,094**	487,785
Land Survey	**195,612**	199,137
TOTAL	**973,592**	975,542
Parks and Recreation		
Administration and General Support	**372,181**	413,882
Parks and Historic Sites	**2,401,485**	1,721,885
Babler State Park	**124,605**	74,814
	2,898,271	2,210,581
TOTAL	**7,511,986**	6,226,086
Source of Funds		
General Revenue	**5,426,120**	4,701,759
Federal	**1,876,426**	1,325,913
Mined Land Conservation Fund	**49,251**	52,297
Babler Trust Fund	**105,694**	74,814
Clean Water Fund	**53,202**	71,303
Revenue Sharing	**1,293**	------
TOTAL	**7,511,986**	6,226,086

CAPITAL IMPROVEMENTS BUDGET EXPENDITURES	Fiscal Year 1976	Fiscal Year 1975
*Division of Parks and Recreation	**$4,364,100**	$3,776,172
**Division of Geology and Land Survey	**34,160**	7,452
	$4,398,260	$3,783,624

*Source of Funds:
Land and Water Conservation Fund
State-Federal Revenue Sharing
Earnings Fund
Dr. Edmund A. Babler Memorial State Park Trust Fund

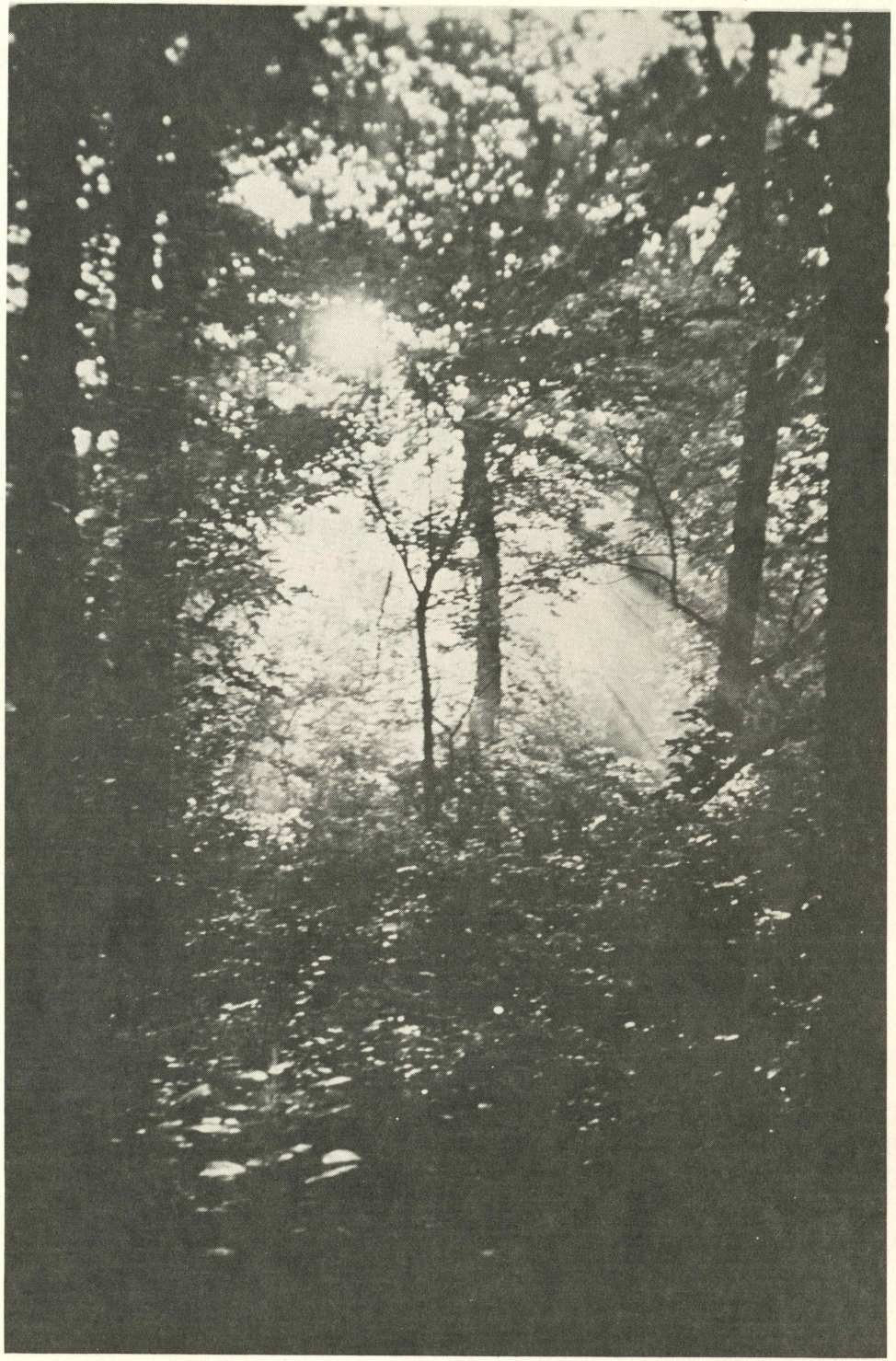
*Source of Funds:
State-Federal Revenue Sharing

CAPITAL IMPROVEMENTS BUDGET	**$4,398,260**	$3,783,624
OPERATIONS BUDGET	**7,511,986**	6,226,086
TOTAL	**$11,910,246**	$10,009,710

The Missouri Department of Natural Resources has the responsibility for administration of federal and state grants to local governments to finance projects for outdoor recreation, historic site restoration, construction of public water supply and wastewater (sewer) collection systems, and wastewater treatment plants.

These grants are, approximate:	Fiscal Year 1976	Fiscal Year 1975	
Outdoor Recreation Assistance Program	**$4,000,000**	$4,000,000+	
Historic Preservation Program	**250,000**	100,000++	
Public Water Supply and Wastewater Collection System	**3,000,000**	3,000,000+++	
Wastewater Treatment Plant Construction	**188,400,000**	100,000,000	++++ +++++
	$195,650,000	$107,100,000	

\+ U.S. Department of Interior, Bureau of Outdoor Recreation
++ U.S. Department of Interior, National Park Service
+++ State Revenue Sharing Funds
++++ U.S. Environmental Protection Agency
+++++ State Water Pollution Control Bonds



DIVISION OF ADMINISTRATIVE SERVICES

At the request of DNR Director Wilson, the State Auditor's Office began a department-wide audit of the Missouri Department of Natural Resources during FY 76. Although the agencies which came into DNR under state reorganization had been audited prior to July 1, 1974, the FY 76 audit was the first for the department.

Made with assistance of the division staff members who provided necessary information, the audit was expected to be completed in the fall of 1976. A departmental audit will be conducted on a continuing basis in the future.

In the early summer of 1976, preliminary reviews by division staff members were initiated on three major grant programs: wastewater treatment plant construction; public water supply and wastewater collection systems, and the State Soil and Water Districts Commission. All three programs have been administered by personnel within DNR's Division of Environmental Quality.

The reviewers were a study team composed of Division of Administrative Services personnel in grants management and fiscal affairs. They recommended that the financial and administrative responsibilities of both the public water supply and wastewater collection systems, and State Soil and Water Districts Commission grant programs be transferred to this division. The transfer was planned for early FY 77. The review is continuing on the wastewater treatment plant construction grant program.

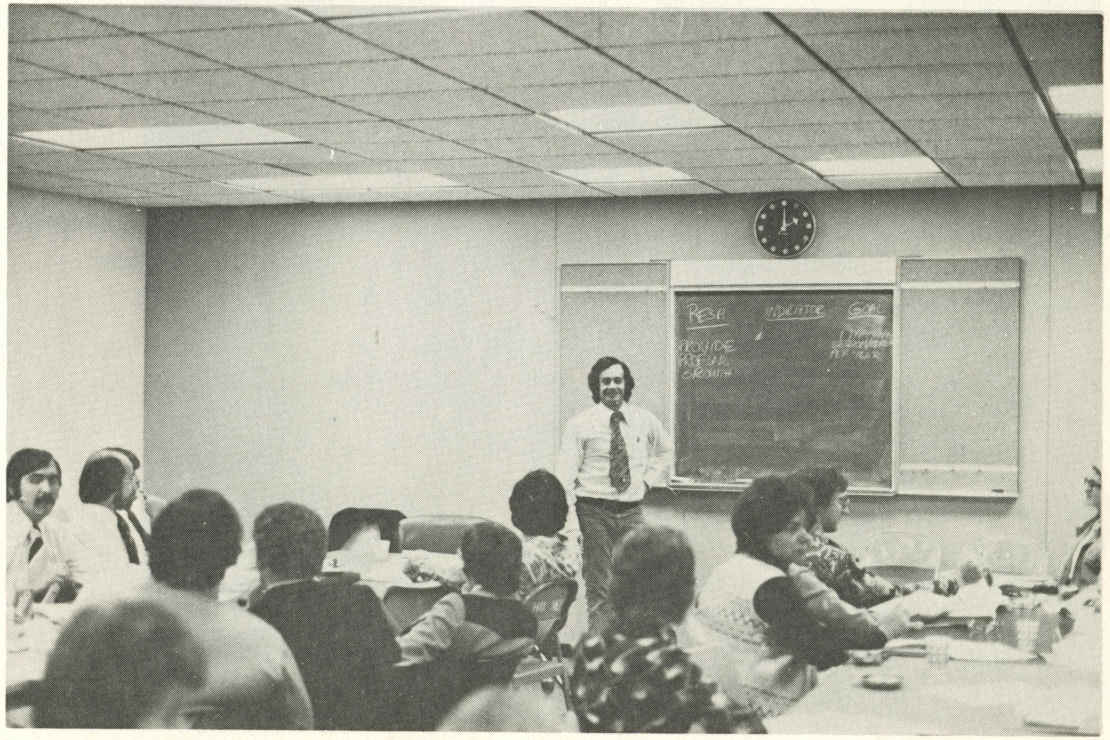
Further consolidation was completed in the division which carries out the internal administrative functions formerly done separately by each of the 14 agencies which came into DNR. The services are accounting, budget, fiscal affairs, grants management, personnel, procurement, equipment and property inventory control.

In addition, the division implements and supervises DNR's role in the Equal Employment Opportunity program, the Govenor's Alcohol and Drug Abuse and Safety programs.

Services performed by the division during FY 76 included:

Monthly financial reports prepared:	34
Payrolls processed:	431
Job applicants interviewed for DNR in Jefferson City:	309
Field training meetings conducted for personnel:	6
Applicants certified and processed for employment:	1,679
Requisitions processed for purchase of materials, equipment or services:	1,070
Seminars conducted on preventative maintenance for equipment:	11
DNR facilities inventoried:	24

Management by Objective (MBO) sessions were frequent for DNR as department adopted this management efficiency program in fiscal 1976. Marvin J. Nodiff, director of DNR Division of Planning and Policy Development, explains the approach to his staff members.



DIVISION OF PLANNING AND POLICY DEVELOPMENT

Increasing concern with our natural resources has led to a growing awareness of the impact of public policy toward the environment. The Division of Planning and Policy Development (DPPD) plays a key coordinating role for the Missouri Department of Natural Resources (DNR) legislative program, A-95 review and comment, and other special issues involving close cooperation of federal, state and local components of government.

Progress for the division during FY 76 is best measured by highlighting several noteworthy accomplishments which have added clarity to major sectors of natural resource management and environmental policy.

First, the DNR "Future Directions Program" was designed to focus staff attention on the identification of long-range problems and development of a method of determining solutions which could be characterized by responses from the public. Results of this survey were published in a final report titled, "Attitudes of Missouri Leaders on Energy, Parks, Environment, and Land Use." It has served as an orderly method for determining solutions involving public input, and as a source for developing administrative and legislative measures in a fashion allowing the department to prioritize our attention to major natural resources problems.

Findings from the report demonstrated strong support for some measures and prompted several others. Two of these legislative measures, the "Tar Sands Bill," and recreational cost-sharing between the state and U.S. Army Corps of Engineers at Smithville and Long Branch Reservoirs, were both enacted during the 1976 legislative session. Other measures developed for further consideration include the Missouri Radiation Protection Act, Power Plant Siting, Dam Safety, Energy Conservation, and Toxic and Hazardous Waste Disposal.

Future Directions

The highest overall public concern demonstrated in the "Future Directions Program" is for the need to improve state safeguards over radiation materials and the siting of nuclear power plants. Accordingly, this division conducted the first detailed research on these problems as they exist in Missouri.

From the research, legislation was prepared by DPPD and later considered on Feb. 17, in public hearing by the House Atomic Energy and Industrial Development Committee. These two measures died in committee. However, continued interest in these matters and requests to the legislature by DPPD resulted in the appointment of a House interim committee to study these measures in greater depth and to make recommendations to the 1977 General Assembly. This interim committee, the "Select Committee on Radiation Problems and Nuclear Energy Development in Missouri," was created in July 1976. The committee requested that the Division of Planning and Policy Development serve as its staff.

DPPD staff members are preparing the first comprehensive statewide water plan since 1939. During the past year, the staff completed an update of the state historic preservation plan, published as "Foundations From the Past." Work on the state's energy conservation plan was begun by the energy staff during 1976. Additionally, a major revision of the state comprehensive outdoor recreation plan was completed. Studies and reviews by the professional staff have resulted in strong state support of federal wilderness area designation in Missouri.

With a small, dedicated staff numbering 35 and total budget of $608,836, DPPD has developed a successful track record on many important issues involving natural resource policy and problems in the state.

The following summaries provide a detailed account of the division activities and accomplishments of DPPD's four administrative programs during FY 76.

MISSOURI ENERGY AGENCY

The Missouri Energy Agency (MEA) was created by directive of Gov. Christopher S. Bond in January 1975 when he asked the Missouri Department of Natural Resources to assume responsibility for consolidating and coordinating state energy programs. The Missouri Energy Council, established by the govenor in response to the oil embargo of 1973, provides advisory assistance to the DNR energy staff, and DNR Director Wilson serves as council chairman.

Among the immediate tasks were the need for a professional staff, and for precise, in-depth data depicting the state's position in the energy crisis. Goals were set for the state which emphasize energy conservation and an increased utilization of Missouri coal.

ENERGY RESEARCH AND DEVELOPMENT

The first analysis of natural gas shortages in Missouri was accomplished through a survey of 1,100 industrial and commercial firms under interruptible contract. From it was determined that interruptible customers would be short 10 per cent of their natural gas needs during the winter of 1975-76, but that this shortage was being satisfied by residual oil, the use of which had doubled. The results of this survey also contributed to selected participation at workshops organized by the energy program staff to call attention to alternatives to natural gas.

Special effort has been made to foster energy conservation efforts in state government. The state now has its first contract for recycled and recyclable paper, and has adopted a strong policy for purchase of new state vehicles. A policy statement to save energy in new and existing state buildings was prepared as a result of efforts by the Missouri Energy Council's Buildings Technology Committee, a group of engineers and architects committed to energy conservation.

A major effort has been to assist a joint venture of two Missouri corporations to develop a large-scale coal gasification proposal. Assistance has been given to refine the proposal and prepare an application for partial funding from the Energy Research and Development Administration (ERDA).

DNR Director Wilson, as Missouri Energy Council chairman, in February 1976 appointed the Coal Research and Development Committee to establish priorities for the utilization of Missouri coal. This committee is chaired by State Geologist Wallace B. Howe, and consists of experts representing coal mining companies, utilities, environmental interests, industry, and the University of Missouri.

An inventory of current statewide energy related projects and programs is being compiled to provide information to interested university and private persons. The energy program staff will be a clearinghouse to provide research and development information to all interested parties.

ENERGY CONSERVATION

MEA received a grant of nearly $75,000 from the Ozark Regional Commission to assist small businesses, industries, and local units of government in energy management. These targets were selected because the smaller firms and governments generally do not have technical expertise to perform energy management services. A total of 256 industries were identified as willing to have plant personnel trained, and then to share this training with other industry, institutions, and local government in the community. A total of 400 were identified as needing assistance.

The state's first Energy Conservation Plan is being prepared as a result of a $100,000 grant from the Federal Energy Administration (FEA). The plan is expected to be prepared in mid FY 77 and make the state eligible for more than $500,000 per year to implement energy conservation efforts by 1980. The plan will emphasize thermal efficiency in new buildings, lighting efficiency in existing structures, the development of energy efficient procurement programs in state and local government, promotion of carpools, vanpools, and mass transit, and energy education. Public hearings were held in June 1976 to gain early citizen input into development of the plan.

The energy program staff was responsible for coordinating the development of a rural transportation demonstration project for the mid-Missouri area. This effort resulted in a $200,000 grant from the Federal Highway Administration to the Mid-Missouri Council of Governments.

The energy program staff is participating in a $250,000 grant from the Ozark Regional Commission to study the impact of natural gas curtailment and alternative fuel sources for Missouri and the region and to recommend policy alternatives.

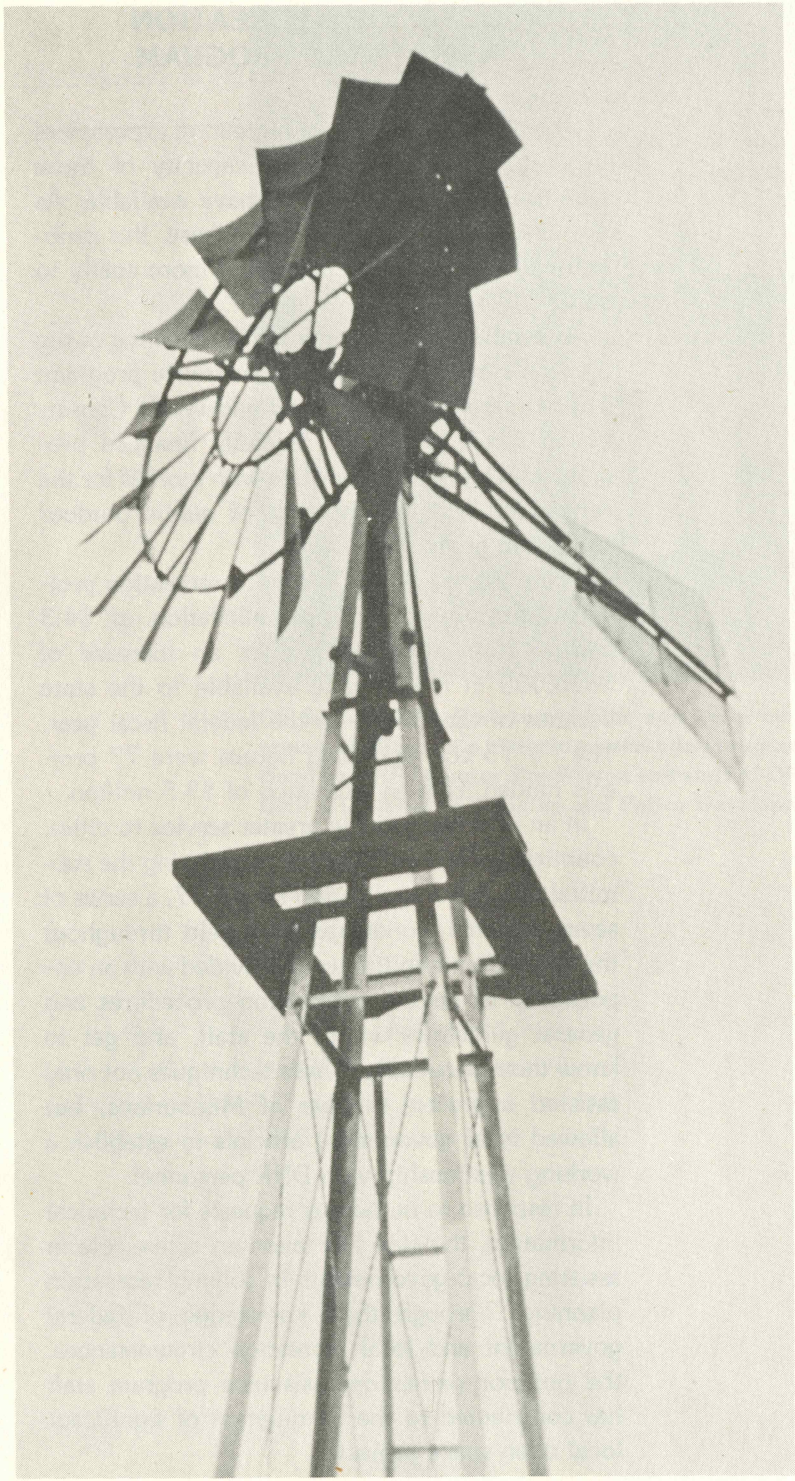
ENERGY EDUCATION

On Sept. 15-16, 1975, the Missouri Energy Council Workgroup on Energy Education and the energy program staff sponsored a retreat at Montauk State Park to discuss the direction energy education should take in Missouri. Participants in this two-day conference included representatives from education, industry, labor, consumer groups and state government.

MEA entered a cooperative agreement with the University of Missouri Extension Division to provide energy information and education services to the citizens of Missouri. A series of energy guide sheets are presently being prepared for distribution by the extension division.

Public service announcements for radio and television on home winterization were prepared under joint sponsorship with the Missouri Department of Consumer Affairs. Pamphlets on gasoline, natural cooling, cheap heat, and insulation were prepared by the DNR energy program staff with the assistance of DNR information services, for general distribution.

A series of energy presentations is available for interested organizations covering the national and Missouri energy situation as well as methods of conservation for all segments of our economy.



OUTDOOR RECREATION ASSISTANCE PROGRAM

The demand for outdoor recreation experiences in Missouri far exceeds the capacity of those facilities which we presently have available. As our leisure time continues to increase, this problem will become more acute and more costly to solve.

Alleviating this dilemma is the objective of the division's outdoor recreation assistance program. The primary tool is the Land and Water Conservation Fund (LWCF), a federally financed program which provides the state with monies for the acquisition and development of public outdoor recreation areas.

In FY 76, nearly 100 outdoor recreation projects were funded from an allocation of $4.3 million from the LWCF after an increase of $875,000 in funds made available to the state because of the change in the federal fiscal year. The FY 75 corresponding figures were 77 projects funded from an allocation of $3.5 million.

In an effort to provide greater service to cities, counties, and school districts considering the submittal of a grant application for FY 77, a series of seven regional workshops were held throughout the state. Communities were provided with an opportunity to discuss application procedures and general guidelines within the staff, and get to know them personally. These techniques not only assisted a greater number of Missourians, but allowed local government officials to establish a working relationship with DNR personnel.

In response to numerous requests for technical information, the staff has taken an active role in assisting local governments in solving recreation planning. Through their knowledge of federal government and local recreation circumstances, the outdoor recreation assistance program staff has contributed to the formulation of significant local open space projects.

OFFICE OF HISTORIC PRESERVATION

Missouri's Office of Historic Preservation, established in 1968, is responsible for identifying and protecting significant cultural resources through documentation and nomination to the National Register of Historic Places.

Since inception of the program, 252 sites and districts have been listed on the National Register. The total number of sites protected is far greater than this figure because many sites are included in each district and even potential nominations receive protection under Presidential Executive Order 11593 of May 1971.

The Missouri Advisory Council on Historic Preservation strongly endorsed the founding and organization of a private nonprofit preservation group, known as the Missouri Heritage Trust, Inc.

Further reorganization within DNR, in keeping with the State Reorganization Act of 1974, resulted in relocating the Office of Historic Preservation from Columbia to Jefferson City, consolidation of administrative functions, and physical incorporation of all staff and equipment with the Division of Planning and Policy Development.

Preservation of cultural resources is encouraged through participation in a federal matching grant-in-aid program. During FY 76, Missouri received $303,646 in federal funds for use in this program. An evaluation system was also devised to provide funds to grant applicants on a basis of need.

Missouri's Office of Historic Preservation, as a part of the Division of Planning and Policy Development, will continue to provide an effective means for protecting cultural resources as a part of the Department's overall concern for our environment.

FY 76 Additions

Sites and districts, which include more than one site, which were entered on the National Register of Historic Places during FY 76 are:

Rockhill Neighborhood, Jackson County, July 21, 1975

Eugene Field House, St. Louis City, Aug. 19, 1975

St. Johns-LaPlant IV Archaeological District, New Madrid County, Aug. 28, 1975

Bunker Building, Jackson County, Sept. 5, 1975

Overfelt-Campbell-Johnston House, Jackson County, Sept. 5, 1975

Second Presbyterian Church, St. Louis City, Sept. 11, 1975

B-9 Structure Archaeological Site, Ripley County, Oct. 7, 1975

Mule Camp Site, Ripley County, Nov. 11, 1975

Holy Corners Historic District, St. Louis City, Dec. 29, 1975

Baptiste G. Aubuchon House, St. Louis County, May 6, 1976

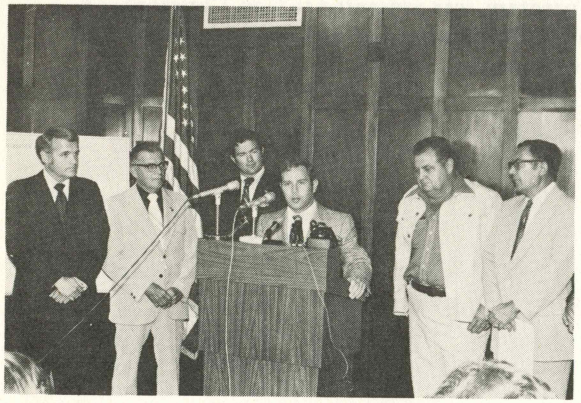
Archambault House, St. Louis County, May 13, 1976

Missouri State Capitol Historic District, Cole County, June 18, 1976

Casa Alvarez, St. Louis County, June 18, 1976

On Sept. 23, the first copy of the new color booklet, "Foundations From the Past," a review of Missouri's historic preservation program, was presented to Gov. Christopher S. Bond by DNR Director Jim Wilson and staff of DNR historic preservation program within DNR's Division of Planning and Policy Development.

On Sept. 8, Gov. Christopher S. Bond designated the Meramec River Recreation Area, a 108-mile stretch of the Meramec River from Meramec State Park to the Mississippi River, focusing public support for preservation of open space and river-based recreation. At announcement ceremony were, from left, Gene McNary, supervisor, St. Louis County; Phillip Hallof Jr., mayor, Kirkwood; Bond; DNR Director Jim Wilson; William F. Weber, mayor, Eureka, and Arthur J. DeGrand Jr., mayor, Sunset Hills.



RESOURCE PLANNING PROGRAM

Six professional resource planners are responsible for developing a state water plan and a state outdoor recreation plan, and for coordinating department-wide reviews of federal projects in Missouri.

During FY 76, the state comprehensive outdoor recreation plan (SCORP) was completed and approved by Gov. Christopher S. Bond. This plan enables Missouri to continue its eligibility to receive federal Land and Water Conservation Fund grants of approximately $3.5 million annually. A recreation planning manual for local governments was also completed. Implementation activities included proposals and studies on:

St. Joe Minerals tract 8,200 acres, St. Francois County.

Maple Woods — 46 acres in Kansas City.

Sunklands/Burr Oak Basin — 1,280 acres in Shannon County.

Missouri Wilderness Proposals.

Ozark Trail Proposals.

The staff continued work on a long-range state water plan, the first since 1939.

The staff assembled a report on the state's requests for water supply storage in future federal reservoirs. Water supply costs to the state now total more than $30,473,000; reservoirs nearing completion are scheduled for early water plan review. The status of state costs for six of these reservoirs follows this summary in tabular form.

The staff coordinated a work schedule for the state agencies which are assisting the U.S. Soil Conservation Service in a four-year, major water planning effort for 23 counties of northwest Missouri. Public hearings on the study proposal will begin in the fall of 1976 in the affected counties.

River Basins

The staff also represented the state's interests in National Water Assessment activities of four interstate river basin organizations. Twenty areas of the state with the most serious water problems were described and reported for the National Water Assessment.

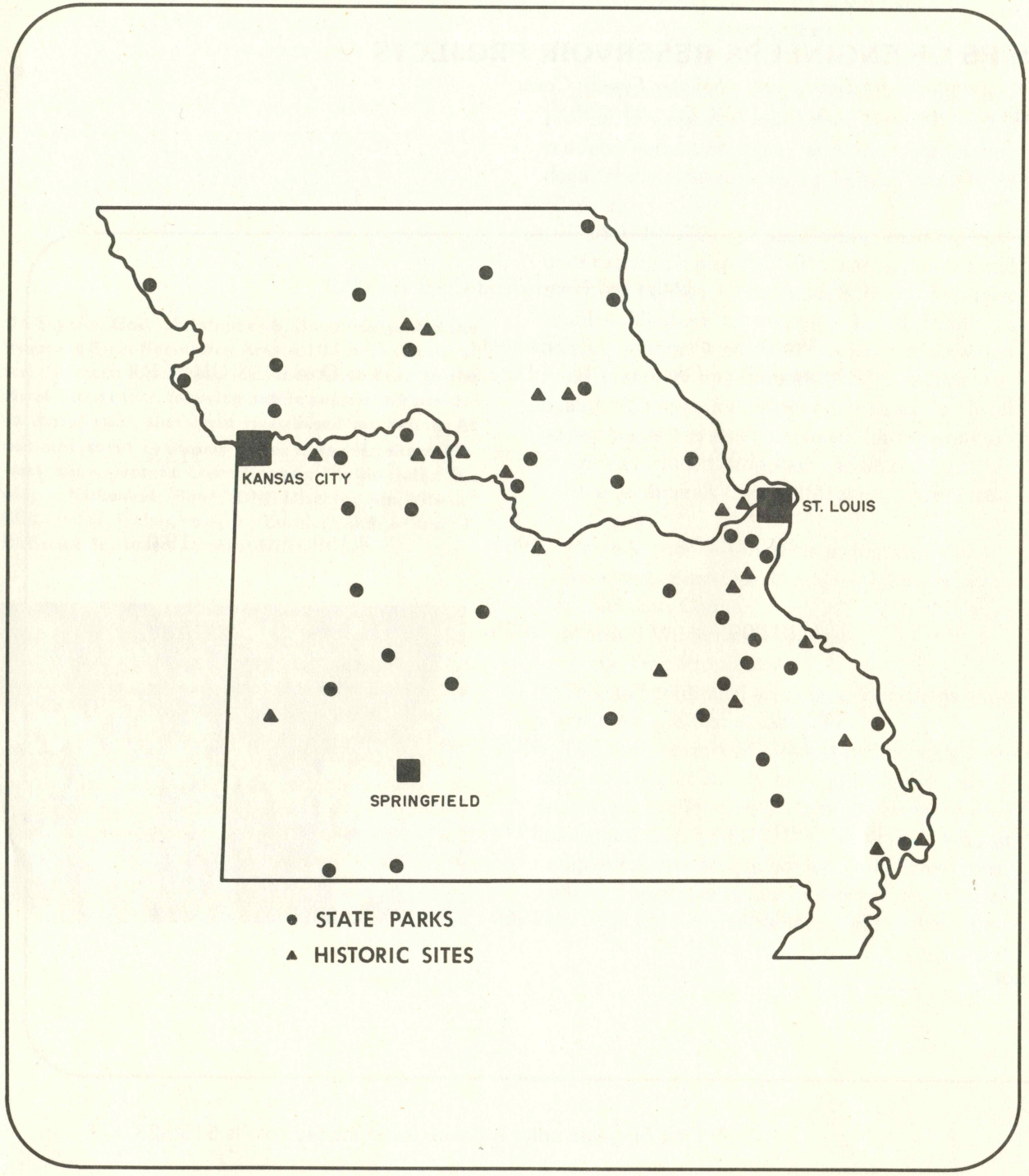
Conscientious, technical reviews of other agencies' plans, proposals and reports and consolidation of the department's views are major goals. Last year the staff screened 2,016 reports, permit applications, and project assessments to judge each proposal's significance to the state's natural resources. The department made comments on 506 of these — mostly advice and cautions to assist applicants with compliance with state or federal regulations. But department review showed a need for major changes of scope on four federal proposals. As a result, changes are being negotiated for the location of a transmission line across Lake of the Ozarks and for a gravel quarry operation next to the new state park on the lower Meramec River; a federal plan for a national scenic river on stretches of the Gasconade River was turned down — in favor of local control, and a proposal to aid boaters by clearing about 4,150 snags and trees along the lower Black River was abandoned — at substantial savings to taxpayers.

U.S. ARMY CORPS OF ENGINEERS RESERVOIR PROJECTS

with State Assurances for Repayment of Water Supply Costs
(Federal Water Supply Act of 1958, P.L. 85-500)

Reservoir Project	Status/3/31/76	Estimated Non-federal Costs ($1,000) Water Supply Storage (Acre-Feet)	Estimate Date	First Cost	OM & R
Long Branch	Construction 38% complete	6,200	1975	$ 1,354	$13.5
Pine Ford	Preconstruction planning underway	45,500	1969	4,159	19.0
Prosperity	Preconstruction planning begins FY 1977	19,000	1975	11,000	86.3
Clarence Cannon	Construction 38% complete 3/31/76	20,000	1975	9,500	19
Meramec Park	Construction 20% complete 3/31/76	19,200	1975	560*	58
Union	Preconstruction planning complete, construction — start not funded by Congress	98,900	1969	3,900	17.1

* First 50 years only; ultimate water supply cost is $13,328,000.



Drawing by FRANKIE PHELPS

DIVISION OF PARKS AND RECREATION

The Division of Parks and Recreation continued to make progress toward its goal of acquiring and developing park lands while providing services and recreational programs for the millions who visit our state parks and historic sites every year.

NEW ACREAGE AND MAJOR IMPROVEMENTS

Three new state parks and one historic site, encompassing more than 10,000 acres, will be developed for future use as the result of acquisition plans announced during the 1975-76 fiscal year.

The site of the northernmost battle fought in Missouri during the Civil War — the Battle of Athens — was acquired as a state park. The 354-acre tract, bordering the Des Moines River, will include a camping area, several lakes, picnic areas, and a playground when development is completed.

A lease agreement with the U.S. Army Corps of Engineers was signed in April for development of the new 1,440-acre Truman State Park near Warsaw. Basic development is ongoing at the park, scheduled to open with completion of the Harry S. Truman Dam and Reservoir by the spring of 1979. The park will have several primitive and developed camping areas, marina, swimming beach, several boat ramps, visitors' center, picnic areas, and hiking and backpacking trails.

The St. Joe Minerals Corp. declared its intent to donate about 8,500 acres of land near Flat River to the state for development of Missouri's second largest state park to be named St. Joe.

For the first time in its 52-year history, the Division of Parks and Recreation entered into a lease agreement with a private foundation in December 1975 in order to develop and manage the Dillard Mill State Historic Site in Crawford County. The mill, built about 1900, needs minimal work to be restored to operation and the division plans eventually to open it for daily visitation. The surrounding 138 acres will offer 20 picnic sites and a three-mile trail.

The passage of legislation in the Missouri General Assembly assured future development of two more state parks to be located on U.S. Army Corps of Engineers Smithville and Long Branch Reservoirs north of Kansas City and near Macon, respectively.

The Division of Parks and Recreation also made two additions to existing state parks. At Bothwell Lodge north of Sedalia 110 acres were acquired and basic development of the 185-acre state park there is under way. The division also completed purchase of almost 300 acres adjacent to Rock Bridge State Park south of Columbia in an effort to prevent further pollution to its Devil's Icebox Cave waters.

In addition to new land acquisitions, major capital improvements were made at several state parks and historic sites.

New Outdoor Center

The Jacob L. Babler Outdoor Education Center for the Handicapped, a $1 million facility located at Dr. Edmund A. Babler Memorial State Park west of St. Louis, was dedicated Oct. 2, 1975. With a capacity of 82 campers, this facility includes cabins, an administration center, and a recreation-dining hall. The center is designed to be as barrier-free as possible for campers and includes such features as an inter-building intercom system, extra-wide doorways, special restroom features, and signs with printed and raised letters for those who read Braille. Although all new additions to state parks in Missouri are being constructed to facilitate the handicapped, this center is the only one specially designed to meet their needs. Designed by R. W. Booker and Associates, St. Louis, the center has won several state and national architectural engineering awards.

During the summer of 1975 the one-mile Braille trail at Elephant Rocks State Park was remodeled with ramps and special features in order to accommodate wheelchair visitors.

Campsite additions were made at Lewis and Clark and Bennett Spring State Parks. As the fiscal year closed, a new 100-site camping area was nearing completion at Watkins Mill State Historic Site, the third historic site to offer camping. Twenty-nine state parks now have camping available.

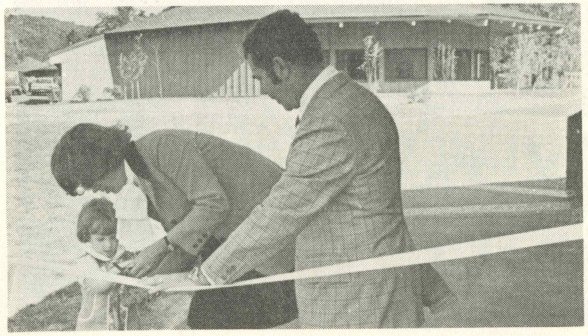
Cabins Now at 195

Three new rental cabins were constructed at Washington State Park and cabin construction was begun at Bennett Spring and Montauk State Parks. The total number of rental cabins available in 11 state parks is now 195.

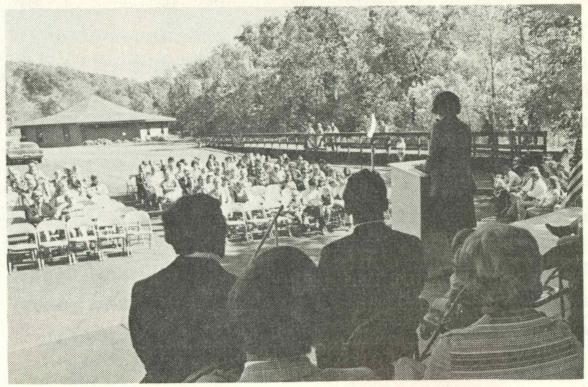
Multi-purpose courts were added at Knob Noster and Babler State Parks, while new playground equipment designed to foster creative thinking in children was built in several state parks. Modern restrooms were added at Table Rock, Pomme de Terre, and Bennett Spring State Parks and construction began on a restroom at Roaring River by crews working under a federal grant to aid the unemployed from the Economic Development Administration (EDA).

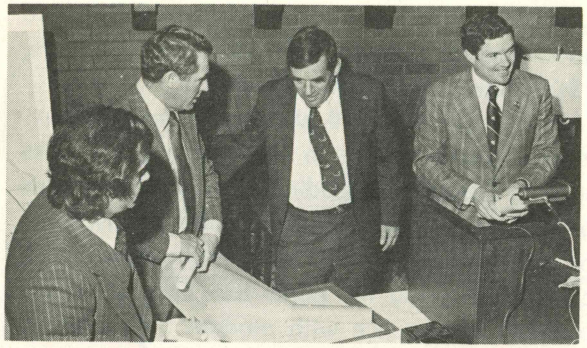
As the fiscal year ended, the Division of Parks and Recreation was putting the finishing touches on restoration of Missouri's newest state historic site, Jefferson Landing. Chosen as the official Bicentennial project of the state, Jefferson Landing is one of the last remaining commercial riverfront landings on the Missouri River. Restoration of the three buildings included in the new site took almost two years. A visitors center is located in the oldest of the three buildings, the Lohman Building, which dates from 1834. The center includes an audio-visual presentation and exhibits which illustrate the history of Jefferson City as a governmental and political center as well as a 19th century river trade center.

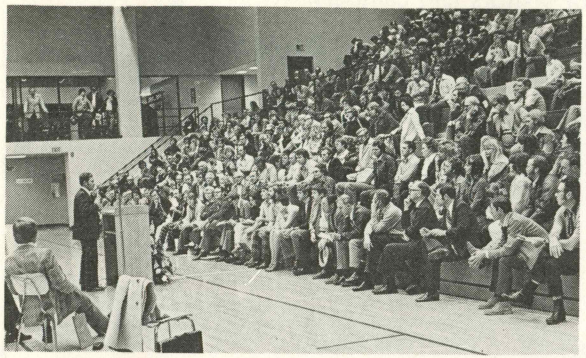
Fiscal year 1975-76 also was a year of many internal improvements in the Missouri state parks system, including upgrading of roads, renovations of cabins, remodeling of restrooms, landscaping of undeveloped land, and improvements of campsites, giving the parks and historic sites a polished appearance with modern conveniences for visitors and campers.

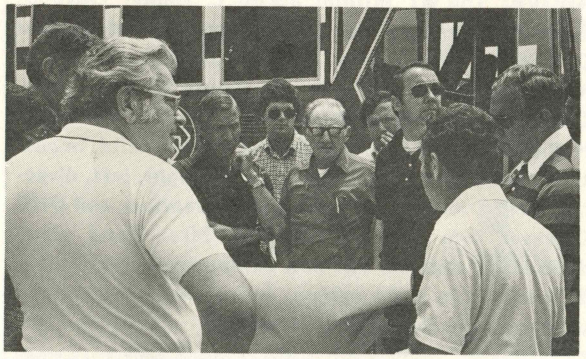


ABOVE: The $1 million Jacob L. Babler Outdoor Education Center for the Handicapped was dedicated Oct. 5 in ceremonies at Dr. Edmund A. Babler Memorial State Park in St. Louis County. Mrs. Carolyn Bond, wife of the governor, assists Katherine Keller, the 1975 March of Dimes Poster Child, in cutting ribbon. Flanking them are Bill Wight, left, director, DNR Division of Parks and Recreation, and DNR Director Jim Wilson. BELOW: Mrs. Bond gives dedication address. The new camp can accommodate 81 persons in eight cabins, and serves handicapped youth groups throughout Missouri.









TOP: Gov. Christopher S. Bond announced Dec. 18 that St. Joe Minerals Corp. which has mined lead in Missouri for more than a century has donated 8,500 acres south of Flat River in St. Francois County to the state for a park. MIDDLE: About 350 persons turned out to hear DNR Director Jim Wilson react to proposals for development of St. Joe State Park at public meeting Feb. 17 at the Mineral Area College near Flat River. BOTTOM: DNR Director Jim Wilson, right, shows plans for St. Joe Park to legislators and guests on first educational tour of Missouri state parks.

PARKS DESIGNED WITH PEOPLE IN MIND

Recreation programs are an important aspect of the division's people oriented approach to park management and during this year it sponsored 10 special events, including motorcycle hill climbs, bluegrass musical festivals, a sailing regatta, and a crafts festival. In addition to these yearly events, the division sponsored a special exhibit of drawings by George Caleb Bingham at his home at Arrow Rock State Historic Site.

The Learn to Camp program entered a third successful year as beginning family campers learned the art of camping and cooking outdoors in three-day sessions at three state parks located near metropolitan areas — Pomme de Terre, Wallace, and Washington. Almost 100 families participated in the Learn to Camp program during the summer of 1976 and spent an economical vacation perfecting their camping skills.

The camper awards program continued for the sixth year as about 400 families were expected to camp in five different Missouri state parks in order to earn camper award certificates and patches.

MRRA Named

Promoting the recreational potential of the lower Meramec River, the division was instrumental in establishing the Meramec River Recreation Area coordinating committee, made up of representatives from all levels of government and the private sector. The committee acts as an advisory group in making recommendations for the planning, development, and management of the 105 miles of the lower Meramec River, designated in September 1975 by Gov. Christopher S. Bond as the Meramec River Recreation Area.

In addition, the division coordinated publishing of the brochure "The Meramec Concept" which describes this 105-mile stretch.

The seasonal recreational specialist program included 16 state parks during the summer of 1976. Utilizing full and part-time programmers as well as interns and volunteers, guided nature hikes during the day and campfire programs at night were made available to visitors at these parks. During the winter six fulltime naturalists continued their talks to school groups and nature interpretive centers at Babler and Bennett Spring State Parks remained open daily.

Organized group camps for non-profit youth organizations continued operations in seven state parks. Many youth organizations also continued to use primitive camping areas available in most state parks.

The Youth Conservation Corps program ongoing at Babler State Park for the past three years was extended to Lake of the Ozarks State Park. Administered by the division, the co-ed camp is designed to teach youths about their environment and how to use our natural resources wisely. Work and study is combined during the 10-week sessions.

The tavern at Arrow Rock State Historic Site reopened during January 1976 under new management. Open every day except Monday, the tavern offers home-cooked meals served by waiters and waitresses in period costumes.

In cooperation with the Missouri Department of Conservation, the Division of Parks and Recreation began a wildlife habitat improvement program at Knob Noster and Cuivre River State Parks. The program includes developing feedlots to maintain the plentiful supply of wildlife living in both park areas as well as controlled burning of a 10-acre tract at Cuivre River in an attempt to return the land to an earlier stage when prairie grasses and plants thrived there.

In the area of public information, the division designed and printed one-page handouts for the first time on every state park and historic site in Missouri.

TRAILS DEVELOPMENT

In January 1976 the Missouri State Trails System Plan was presented to Gov. Christopher S. Bond. The study, a cooperative effort by the University of Missouri Recreation Department and the Missouri Department of Natural Resources showed that hiking and related outdoor activities have grown in popularity while the state's supply of trails is far short of the demand. According to the plan, the state offered 1,500 miles of hiking trail in 1975, only half the actual need.

In an effort to begin implementing the plan, the division began greatly expanding trails development in the state parks during the fiscal year. Close to 100 miles of hiking, horseback riding, and backpacking trails have been constructed by Economic Development Agency trail crews in eight state parks; these were scheduled for completion by Sept. 30, 1976.

In addition, park crews and volunteers have been active in trail development.

The first backpacking trail in the state parks system opened in April, 1976 at Trail of Tears State Park north of Cape Girardeau. "Peewah" Trail is 10 miles long and may be used by hikers, backpackers, and horseback riders. Other backpacking trails have been completed or are under construction at Washington, Lake Wappapello, Lake of the Ozarks, and Hawn State Parks using both trail crews and volunteers.

PARKS FOR THE FUTURE

Recent recreational surveys indicate that hiking, camping, and outdoor activities are gaining greater popularity. The Division of Parks and Recreation must continue to expand and improve its facilities in order to meet these needs. A developmental plan for upgrading the Missouri parks system has been developed by H.O.K. Associates, Inc. of St. Louis. If implemented, the $200 million plan would improve existing facilities in Missouri state parks as well as add more lands to be preserved for state parks and historic sites. The plan estimated that Missouri's population will increase 18.4 per cent by 1985 but recreational demands will increase 3.5 times faster than the population. Thus, a sizable challenge faces the Division of Parks and Recreation in the future.

Motorcyclist powers his bike up steep 110-ft. hill during June 20 Hill Climb at Battle of Athens State Park in northeast Missouri. The climb was a challenge for semi-professional motorcyclists competing and drew 1,000 spectators.

What's more fun than swinging, especially on a brand new tire swing like this one at Montauk State Park near Salem. Traditional slide and swing sets, monkey bars and merry-go-rounds are giving way to more creative playground equipment in state park system.

DIVISION OF ENVIRONMENTAL QUALITY

A major achievement of DNR's Division of Environmental Quality (DEQ) was the physical consolidation of all its programs into a single 15,000-square-foot building at 2010 Missouri Blvd., in Jefferson City.

The consolidation improves communication between the division program staffs and the public. Located there are the air quality, water quality, solid waste management, public water supply, soil and water conservation, land reclamation, laboratory services and Jefferson City regional office programs.

The air quality and water quality laboratories were combined as the new laboratory services program responsible for chemical and biological analyses and air quality and water quality monitoring.

Five other DEQ regional offices in Kansas City, St. Louis, Springfield, Macon and Poplar Bluff continue to provide regional centers to serve the public in outstate Missouri on questions of environmental concern.

As a continuing goal to meet the public's needs, DEQ joined with the Missouri Municipal League and the Missouri Association of Counties in sponsoring a series of seminars to acquaint local officials with DEQ rules and regulations and up-to-date information. The seminars were conducted in Blue Springs, Jefferson City, St. Charles, Springfield, Sikeston and Kirksville.

DEQ also participated in the Missouri Higher Education Manpower Project which gives college students on-the-job training and academic credit while providing state agencies with additional staff for special projects. During FY 76, a University of Missouri-Rolla student assisted in a cost study of solid waste collection.

DEQ was selected for the Missouri Government Professional Development Award from the Missouri Society of Professional Engineers, recognizing government agencies with effective employment practices for professional engineers.

AIR QUALITY PROGRAM

The quality of Missouri's air is improving. Almost every area in the state now meets the national primary ambient air quality standards established under the Clean Air Act of 1970, designed to protect public health.

Missouri's regulations cover such varied sources of air pollution as automobile emissions, odors, sulfur compounds, fugitive dust, open burning, industries, power plants, incinerators, and air pollution episodes.

In June 1975, however, Missouri suffered its most extensive incident of sulfur dioxide vegetation damage when some 89 species of vegetation in a 2,000-acre area on Taum Sauk Mountain were affected by pollutants from a nearby lead smelter. The area had recovered by the spring of 1976.

Also, a major air pollution episode occurred on July 3, 1975 when a statewide air pollution "watch" was called because of a stagnant air mass hanging over much of our state. The "watch" ended on the Fourth of July without the need for declaring an "alert" requiring industries, utilities and individuals to voluntarily reduce emissions under the worsening air conditions.

These two episodes notwithstanding, Missouri's air quality shows improvement. An exception is the St. Louis metropolitan area which has not attained the primary standards for carbon monoxide and photochemical oxidants. The U.S. Environmental Protection Agency (EPA), which suspects these pollutants to be primarily caused by the automobile, has required Missouri to develop a traffic control plan for this area. This plan has required much attention during FY 76 by DNR's air quality program staff and the Air Conservation Commission — a 7-member citizens commission appointed by the governor.

The responsibility for developing this plan lies with the air quality program staff and the commission.

The plan includes a regulation which controls the emission of evaporative hydrocarbons such as gasoline from storage, loading, and transfer at bulk terminals and service stations. Controlling these reactive hydrocarbons is expected to reduce the level of photochemical oxidants, a serious pollutant in the St. Louis area.

The commission also will be considering adoption of regulations controlling other stationary sources of pollution such as degreasing and dry cleaning operations, automotive painting, metal coating, and other surface coating operations.

Auto Inspections

To control carbon monoxide emissions from automobiles, the air quality program staff is developing for consideration by the commission an inspection/maintenance (I/M) plan for the St. Louis metropolitan area. Such a plan requires legislative approval which will be sought during the 1978 legislative session.

If voluntary actions by the public such as car pooling, park-and-ride plans, reserved bus lanes, mass transit, traffic signal synchronization and rescheduled working hours fail to reduce auto emissions, the commission will consider seeking the authority to enforce these measures.

Some areas in St. Louis also are not attaining the national standards for particulates and sulfur oxides. Although individual emission sources in the area meet the state's air quality regulations, all of them together contribute to excessive emissions. The air quality staff plans to draft specialized regulations to control this problem, and a similar plan is being developed for the Kansas City area which is exceeding the particulate standards.

The commission adopted new source performance regulations for the entire state. Twelve source categories are listed: power plants, large incinerators, portland cement plants, nitric acid plants, sulfuric acid plants, asphalt plants, petroleum refineries, gasoline storage vessels, secondary lead smelters, secondary brass and bronze plants, iron and steel plants, and large sewage treatment plants.

Also adopted were amendments exempting rock quarries, grain mills and cotton gins from certain emission regulations, and exempting boilers at small plants from requirements to install stack testing devices.

Not all Missouri industries comply with the state's regulations. Those needing time to comply with the emission regulations must request a variance from the Air Conservation Commission which is then heard publicly. During FY 76, the commission granted 34 variances and denied one request.

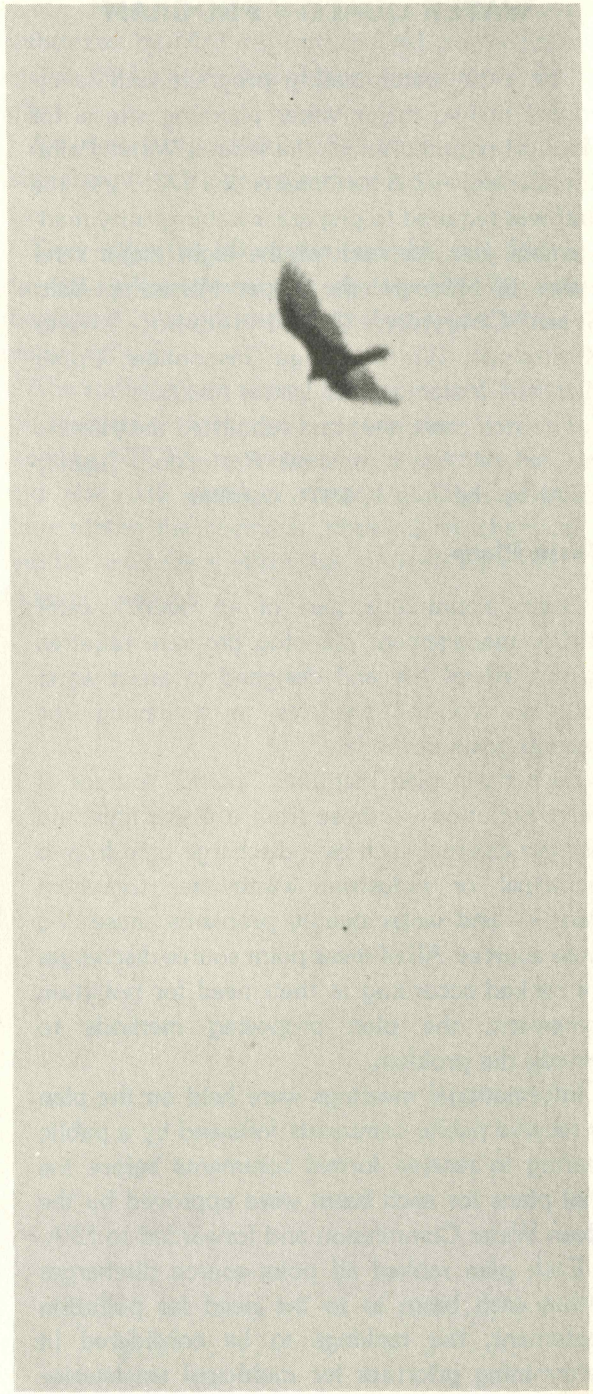
The DNR air quality program staff places a high value on citizens complaints in carrying out its responsibility to enforce the regulations. In FY 76, they investigated 225 citizen complaints. The staff each year also inspects all major point sources of pollution which are those sources emitting 100 tons per year. Minor point sources, emitting from 25 to 100 tons per year are inspected every two years.

The staff made three special enforcement surveys of commercial and industrial operations at Sedalia and St. Joseph, and the cotton gins in southeast Missouri, to determine compliance with the regulations.

In cases of non-compliance, the staff issued 86 violation notices and accompanying warning letters, and 10 abatement orders. Two cases were referred to the Missouri Attorney General's Office for court action.

In air monitoring and analyses, the staff operated 33 air sampling stations, each site equipped to meet the sampling requirements for its area. In order to ensure continued compliance, the staff is beginning to monitor specific sources or industries. Five such samplers now are being operated. Two continuous air monitoring trailers are in operation in North Kansas City and St. Charles, and a mobile sampling van is available to monitor at temporary sites.

In FY 77, the air quality program will prepare a comprehensive air quality data report for the state based upon the program's expanded data handling capabilities.



WATER QUALITY PROGRAM

The DEQ water quality program staff is involved in two major water planning efforts for Missouri required under the federal Water Pollution Control Act Amendments of 1972. First, the staff was required to prepare a water quality management plan for each of the eight major river basins in Missouri: the Upper Mississippi-Salt; Grand-Chariton; Grand-Neosho; Lower Mississippi; White; Osage-Gasconade; Upper Mississipi-Meramec, and Lower Missouri.

The staff completed and submitted the plans to the federal Environmental Protection Agency (EPA) by the July 1, 1976 deadline.

Basin Plans

Basin planning is part of an overall water quality management planning program required by the federal law and designed to assist water pollution control agencies in achieving the cleanup goals of the law.

Each basin plan identifies "point" sources of water pollution — those from a discernible and discrete channel such as a discharge pipe from a municipal or industrial wastewater treatment plant — and water quality problems caused by those sources. All of these point source discharges are ranked according to their need for pollution abatement, the plan proposing methods to remedy the problem.

Informational meetings were held on the plan to receive public comments followed by a public hearing to receive formal comments before the final plans for each basin were approved by the Clean Water Commission and forwarded to EPA.

Each plan ranked all point-source discharges within each basin as to the need for pollution abatement, the rankings to be considered in determining priorities for municipal wastewater treatment projects eligible for state and federal construction grants.

Water Runoff

A second major planning effort dealing with "non-point" source water pollution — from agricultural and urban runoff — is required by Section 208 of the Federal Water Pollution Control Act Amendments of 1972.

This section requires each state to develop a comprehensive, areawide "208" water pollution control plan for the entire state, with the exception of any areas designated by the governor as having complex water quality problems.

In Missouri, Gov. Bond designated St. Louis, Kansas City and Joplin as such "208" areas.

In the Missouri portion of the St. Louis metropolitan area, the East-West Gateway Coordinating Council has been awarded $2,242,900 for developing the plan for St. Louis City, and Jefferson, Franklin, St. Charles and St. Louis counties.

In the metropolitan Kansas City area, the Mid-America Regional Council was awarded $1.4 million to prepare a bi-state plan for the Missouri counties of Platte, Clay, Ray, Jackson and Cass, and the Kansas counties of Johnson, Leavenworth and Wyandotte.

The Joplin area, including Joplin, Carthage, Carl Junction, Webb City and Neosho, will have its plan prepared by the Ozark Gateway Coordinating Council which has received $429,500 for preparation.

The governor designated the DEQ water quality program staff as the lead agency for developing the plan for the remainder of the state, and EPA awarded $1,013,000 to pay for its development.

DEQ has set up several advisory committees to assist the staff: for areawide agricultural and silvicultural (forestry), and for mining. Another for the construction industry will be established in FY 77.

The statewide "208" plan must be completed and submitted to EPA by Nov. 1, 1978.

Stream Surveys

In addition to these major planning efforts, the water quality program staff at the direction of the policy-making Clean Water Commission, has been cooperating with the Missouri Department of Conservation on stream surveys of the Big Piney River and Dry Creek. Their results will be reviewed by the Clean Water Commission before the commission considers possible amendments to the state's existing water quality standards.

The commission has adopted nine regulations relating to the storage of hazardous materials; prevention of pollution from wells to subsurface waters; enforcement; definition; application for discharge permits and letters of approval; effluent standards; notification of spills and accidental discharges affecting waters; public participation, permit processing and issuance, and the disposal of wastewater in subdivisions.

During FY 76, the commission added to the permit regulation to provide other methods for subdivision developers to obtain permits to construct and operate central sewage collection and treatment systems.

The commission also adopted five new policies concerning water pollution control during FY 76. These policies:

— Prohibit the award of state or federal funds for wastewater treatment plant construction to any municipality or sewer district which does not meet the self-monitoring requirements of its discharge permit, and prohibit grants for applicants who are not properly operating and maintaining their treatment facilities;

— Amend the policy on disinfection requirement for wastewater discharges following a change in the federal EPA regulation. Disinfection still will be required for discharge upstream from recreational areas, and to streams that lose a major part of their flow to underground waters. Fecal coliform limitations are not mandatory.

— Require all existing and proposed wastewater treatment facilities to be enclosed with a fence at least five feet high and a gate with a lock, and to have signs warning children of danger;

— Allow any permittee with a wastewater facility with a design flow of 5,001 gallons per day (gpd) to 22,500 gpd, but with an actual discharge flow of less than 5,000 gpd, to request that its permit be reissued to include the monitoring frequency requirement for a flow of less than 5,000 gpd.

— Allow case-by-case exemptions from the 1977 federal requirement for secondary or biological, treatment.

This policy would become effective only if Congress passed a proposed amendment allowing case-by-case exemptions from the deadline set for secondary treatment.

The commission also made minor revisions in the standard conditions for National Pollutant Discharge Elimination System (NPDES) permits. The changes have no effect upon the issuance to municipalities.

These NPDES permits are required before wastewater can be discharged into the state's waters. They are designed to maintain and improve the water quality by limiting the kinds and amounts of pollutants in each discharge. Industries discharging into the state's waters must provide a degree of treatment which will meet state and federal effluent standards and water quality standards.

The NPDES permits also serve as state construction and operating permits.

Missouri has issued a total 2,682 NPDES permits.

Currently in compliance with their schedules are 80 per cent of the major municipal permittees; 85 per cent of the major non-municipal; 75 per cent of the minor municipal, and 83 per cent of the minor non-municipal.

Grant Programs

To assist municipalities and political subdivisions in constructing wastewater treatment facilities which comply with the law, regulations and permit requirements, the Clean Water Commission and water quality program staff administer the federal construction grant program.

In FY 76, the Clean Water Commission approved $188 million in construction grants to sewerage projects throughout the state, for increases in previous grants, and for grants for planning future construction projects. The federal funds amounted to $157 million. The state grant program amounted to $33 million. The state program pays 15 per cent of the project cost, and was made possible by the $150 million bond issue approved by Missouri voters in 1971. Local funding provides an additional 10 per cent of the cost of each project.

Six public informational meetings were conducted by the commission on questions of providing funds to continue the state construction grants program and funding for large secondary treatment plants. The hearings were held in Jefferson City, St. Joseph, St. Louis, Springfield, Hannibal and Cape Girardeau.

To check proper construction of wastewater treatment facilities, the staffs of the water quality and regional offices in DEQ review construction plans and specifications for all permittees and grant projects and routinely inspect treatment facilities for proper maintenance and operation. In FY 76 they reviewed more than 350 plans; inspected 85 major municipal wastewater treatment facilities, 24 major non-municipal, 325 minor municipal, and 654 minor non-municipal facilities. They also inspected 287 treatment facilities in response to citizens complaints.

Enforcement of the laws, regulations and permit requirements is the responsibility of an enforcement officer with the water quality program, and the Missouri Attorney General's office.

The Missouri Attorney General's office was authorized by DNR to initiate legal proceedings against 20 facilities, five of them the results of fish kills.

An important support staff is the water quality laboratory which gathers and analyzes water samples.

They collected 80 stream samples and 56 industrial effluent samples during FY 76 and monitored 10 major and minor dischargers of municipal effluent.

The staff plans to survey approximately 70 major municipal dischargers to see that they are meeting NPDES provisions on a routine basis, and also will conduct stream quality surveys determining the chemical, physical, biochemical and bacteriological effect that effluents have upon Missouri streams.

WATER SUPPLY PROGRAM

The nation's first comprehensive regulations for drinking water are set forth in the Safe Drinking Water Act passed by Congress and signed into law by the President on Dec. 24, 1974. The act is designed to assure that all of the nation's water supply systems serving the public meet uniform minimum standards for the protection of public health.

The water supply program staff is preparing to assume responsibility in Missouri for meeting the law's regulations, which become effective June 24, 1977. Much time and attention has been devoted to an assessment of existing procedures and activities which might need changing to comply with the law.

The staff's initial assessment indicates a need for additional personnel to identify which public water systems will be covered when the law is fully implemented, and to identify the potential problems in complying with the law's provisions. Missouri's existing statutes and regulations also are under review to ascertain those which must be changed to conform with the SDWA.

Routine functions were continued by the staff in FY 76, including the regular supervision of the design, construction, maintenance and operation of public water supplies and swimming pools, and the supervision of extensions and improvements to existing facilities.

In FY 76, the staff reviewed 349 plans for new public water supplies and 19 plans for new swimming pools in a review process designed to prevent defects in design and construction which might otherwise result in poor performance once the facilities are operational.

Training Programs

To provide technical training to the operators of public water supplies, four operator training schools were conducted and 44 certificates of completion were issued. Operators attended

classes one day a week for 10 weeks. They received instruction in sample collection, laboratory analyses procedures, mathematics, chemistry, chlorination and maintaining the safety of public water supplies. After the training program, the operators were eligible to take the voluntary examination for certification under the authority of the Missouri Operator Certification Board. The training program was funded by the federal Comprehensive Employment and Training Act.

Eleven seminars were held for swimming pool operators with total attendance of 373.

The water supply program staff routinely makes field and laboratory checks to further insure the proper operation of Missouri's 1,065 public water supplies serving about 4.3 million persons. In FY 76, the staff inspected about 70 per cent of all public water supplies in the state.

In a cooperative program between DEQ and the Missouri Division of Health, all public water supplies in Missouri are scheduled for routine chemical analyses. Surface water supplies are analyzed annually and groundwater supplies, which are less subject to change, are analyzed every two years. Under the monitoring program, the Division of Health performs laboratory tests for contaminants in water samples, including mineral analysis, trace chemical (inorganics) analysis and pesticide (organics) analysis.

The mineral analysis includes tests for pH, total alkalinity, total iron, sodium, potassium, calcium, magnesium, nitrate sulfates, chlorides, fluoride, total dissolved solids on evaporation and total hardness. All public water supplies in Missouri are tested for minerals every two years. The Division of Health tested 541 samples in FY 76. Over the last two years, only 58 out of 1,065 supplies were found to exceed certain mineral standards. Most of these cases involved excessive levels of iron or manganese, resulting in taste and odor problems. None of the cases presented a health hazard.

Seventy-eight samples were tested for trace chemicals which include arsenic, barium, cadmium, chromium, copper, cyanide, lead, mercury, lithium, selenium, silver, strontium and zinc. None of the samples contained excessive levels of trace chemicals.

The staff also received 416 samples to determine the presence of pesticides. Again, none exceeded a maximum contaminant level.

Eighty-six special analyses were performed to identify specific problems.

Radiological analyses were performed on 42 selected supplies representing various types and sources of water supplies in different geographic areas. In all cases, the radiological levels in the water were so low that no reading could be obtained or the readings were negligible.

After examining 1975 data on trace chemicals and radionuclide analyses, the water supply program staff concluded that most public water supplies in Missouri would not violate any of the federal SDWA maximum contaminant levels. About 20 cities, however, would not meet the SDWA standards for fluoride.

Fluoridation for Cities

DEQ's water supply program also is assisting the Missouri Division of Health in a voluntary fluoridation program. DEQ is providing technical assistance, while the Division of Health is providing public water supplies with $330,000 to purchase the necessary fluoridation equipment.

About 60 Missouri cities presently practice artificial fluoridation of their drinking water supplies. During FY 76, more than 100 public water supplies requested funds for fluoridation equipment under the cooperative program.

To assist local governments in financing new facilities and improvements to existing plants, the water supply program administers a state grant program. Supplemental funds are provided for construction of public water supplies and sanitary sewer collection systems. During FY 76, the program awarded $1,982,800 to 14 public water districts and $1 million to nine sanitary sewer collection facilities.

SOLID WASTE MANAGEMENT PROGRAM

Providing for disposal of our daily refuse, trash and garbage is a vital local service which affects everyone and must be provided in a safe and healthy manner. Open dumps are unsightly and can pose serious health and safety hazards.

The solid waste management program closed 146 open dumps in FY 76, and intends to close all remaining open dumps in Missouri by 1980 to ensure that the entire population is served by approved sanitary landfills. The schedule calls for closing 172 known dumps in FY 1977. In 1970, there were more than 400 such open dumps.

Missouri's solid waste management law was revised in FY 76 to exempt certain cities and counties from the requirement to provide for solid waste collection and disposal, and to submit solid waste management plans.

The 1972 law had required all cities and counties to meet these requirements. The revised law requires only the three counties of St. Louis, Clay, and Jackson, the cities in those three counties, and all other cities with a population of more than 500 to submit solid waste management plans.

The deadline for submitting these plans was Jan. 1, 1976. The solid waste management program has received 391 plans; 476 cities are required to submit such plans.

The plans must identify existing solid waste systems and proposed plans for improvements which must conform to requirements of the solid waste management law and the solid waste disposal rules and regulations. Time schedules for developing, constructing and implementing the system must be included.

After reviewing the plans, the planning staff with the solid waste management program then can approve, deny or request additional information to complete the plan. In FY 76, the staff approved 156. Technical assistance is provided to any cities which need help on the plans.

The planning staff also provides technical assistance on resource recovery to cities. DEQ's solid waste management program has recommended that cities of more than 50,000 population and metropolitan areas consider resource recovery as an alternative to landfilling.

Resource Recovery

A study on Missouri's resource recovery efforts recently was completed by the program staff. This study discussed the availability of markets for waste material found in the solid waste stream such as scrap metal, wastepaper, textile waste, scrap glass, plastic scrap, rubber scrap, animal by-products and grease, and used chemicals. It also investigated the potential for using solid waste as a fuel generating electrical power.

Missouri's markets for scrap metal are capable of handling more than what is generated in the state, the study concluded. Limited markets also were found for the other waste materials. In Missouri, using solid waste as a fuel in generating electrical power remains in the experimental stage. However, staff members believe that this recovery method has the potential for using all the processable solid waste generated in the state.

Another study under way involves hazardous wastes, including toxic, flammable, explosive, radioactive, and biological wastes. A survey of selected industries is being conducted to determine what types and quantities are being generated, and will examine how these wastes are being handled.

This survey, planned for completion in FY 77, already indicates the need for more disposal and treatment areas. The staff has compiled a preliminary list, "Facilities Available to Missouri Industry for Disposal or Treatment of Hazardous Wastes," an overview of Missouri's hazardous wastes service industry.

Missouri's solid waste management program has permitted three areas to dispose of hazardous wastes — all in the Kansas City area.

In the St. Louis area, the first industrial waste exchange in the nation was established in FY 76 in which industries may find that their industrial wastes can be used as raw material for another industry.

The waste exchange was established in October 1975. The department helped arrange the original meeting of the bi-state (Missouri and Illinois) planning committee. The St. Louis Regional Commerce and Growth Association administers the waste exchange.

Quarterly lists are compiled of available and wanted waste materials. Code numbers insure the anonymity of the participating companies. Each listing includes the composition, quantity, packaging and geographic origin of the waste. There have been three compilations issued since October 1975. In the March 1976 printing, there were 101 waste materials available, and 14 waste materials wanted.

Hazardous Wastes

While Missouri now has no systematic program for controlling the disposal of hazardous wastes, efforts have begun to develop such a program in FY 76. A group of persons from environmental, agricultural and industrial organizations, and local, state and federal governments are participating in drafting hazardous waste management legislation for the state.

This draft legislation would regulate the storage, collection, transportation and disposal of hazardous wastes. It was to be submitted to the General Assembly in 1977.

While Missouri's solid waste management program is trying to ensure the safe disposal of **hazardous** wastes, staff members have been involved in ensuring the adequate disposal of **non-hazardous** wastes for several years.

DNR has adopted rules and regulations for the design and operation of permitted solid waste disposal facilities. Staff members review the permit applications and engineering design plans for such disposal areas. In FY 76, 56 engineering plans were received, and 58 operating permits were issued.

The program has granted 121 operating permits, 92 to sanitary landfills, 7 to transfer stations, 15 for demolition landfills, 3 for processing facilities, and 4 for special permitted facilities. These serve 82 per cent of Missouri's population.

The division also performs preliminary landfill site investigations to advise whether the site appears geologically and environmentally suitable. During FY 76, 56 sites were investigated and 70 per cent of them were found suitable, 30 per cent were not. This service is provided with the assistance of DNR's Division of Geology and Land Survey, and DEQ's regional offices.

In enforcement activities, in addition to closing 146 known open dumps, DEQ issued 10 closing orders and filed four court actions against dumps and landfills in the state.

The solid waste management program has two special projects for FY 77, a study on the feasibility of resource recovery methods in rural areas, and a cost-effectiveness study of solid waste collection systems for compilation and publication in FY 77.

SOIL AND WATER CONSERVATION PROGRAM

The soil and water conservation program encourages actions at the local level to conserve soil and improve water quality by promoting farming practices which will keep soil on the land where it belongs and prevent it from reaching our rivers, lakes and streams. By conserving our top soil we will be better able to meet world food and fiber demands while at the same time avoid damage to the environment.

Local Soil and Water Conservation Districts have been organized in almost every county in Missouri to aid individual farmers in cooperation with federal agencies and the University of Missouri. DNR hopes to complete soil surveys of the entire state by 1988. Such soil surveys are of great value to individual farmers, highway and urban planners, land developers, and many others.

In FY 76, Atchison and Andrew counties became the 108th and 109th soil and water conservation districts established in Missouri.

Two districts, Osage and Platte, each annexed four townships. The districts now include the entire area of these counties.

As the number of counties organized into districts increased, the soil and water conservation staff began placing more emphasis on working with local soil and water district boards of supervisors rather than on organizing districts. The soil and water conservation staff assisted the boards in preparing long-range soil and water conservation programs, budgets, annual plans of action, and conservation education programs.

Summer Training

The staff also provided assistance to the districts at the 27th annual summer training conference for district supervisors at Springfield. Total registration, highest in its history, was 425 persons representing 68 districts.

Twelve area meetings or "informational" meetings were held throughout the state by more than 350 persons. They included supervisors and district clerks from many of Missouri's Soil and Water Conservation Districts, and representative of the U.S. Department of Agriculture's Soil Conservation Service. The staff holds these meetings each year to discuss problems in districts and recent developments in the field of soil and water conservation.

With the help of local supervisors and the University of Missouri Extension Division, three districts have implemented conservation education programs for 4-H Club members, helping youngsters learn about ecology and conservation.

The staff also cooperates with the DNR water quality program in developing the "208" non-point source plan in Missouri required by the Federal Water Pollution Control Act amendments of 1972. Both the staff and the Soil and Water Districts Commission, whose members are appointed by DNR Director Wilson, are providing input on non-point sources such as agricultural runoff.

Eleven districts have hired 14 soil scientists to supplement 24 SCS soil scientists in Missouri. As part of an ongoing soil survey program, these soil scientists map all soil in a county and publish a soil survey with maps showing the types of soil, and interpretation sheets showing the soil's limitations. The soil surveys are used by local farmers as well as developers.

The USDA's SCS also assists supervisors by assigning one or more technical assistants to each district. These assistants help in preparing soil classification maps, and in planning and installing good soil and water conservation practices.

Slide shows explaining the role of soil and water conservation districts and watershed subdistricts were developed by the state Soil and Water Districts Commission, and supplied to the seven SCS area offices for local use.

REGIONAL OFFICE PROGRAM

With six regional offices, the Division of Environmental Quality (DEQ) can better help Missouri citizens, local governments and industries in their own areas. Regional office staff members can be better informed of environmental problems unique to their region and, as a result, can offer more realistic solutions.Citizens can contact one agency in their area to help them with any environmental problems.

DEQ has regional offices in Jefferson City, Kansas City, Macon, Poplar Bluff, St. Louis and Springfield. The regional office program is administered by one central office in Jefferson City and regional administrators in each region.

Regional office staff members have a broad background in environmental control. They have been trained by other DEQ programs in air quality, water quality, water supply, solid waste, land reclamation, and soil and water conservation.

They assist the other programs in insuring that the state's environmental laws and regulations are enforced. Regional office personnel investigate complaints of pollution, approve construction designs, prepare permits, maintain air monitoring sites, and inspect facilities such as sanitary landfills, air pollution sources, and water and wastewater treatment plants.

During FY 76, the regional offices substantially assisted the water supply, water quality, solid waste, and air quality programs.

Personnel from the six regional offices inspected 725 public water supplies. They made 62 investigations of water supplies which had unsafe water samples in order to collect additional samples. If these also were unsafe, staff members requested the water supply to correct the deficiency.

In water quality, the regional offices inspected 484 municipal wastewater treatment plants and 882 non-municipal plants. Staff members reviewed 231 construction plans for non-municipal facilities. They also collected 36 effluent samples from municipal facilities and 206 from non-municipal facilities for laboratory analyses.

A major effort was made to close the state's open dumps. In FY 76, the regional offices closed 146 open dumps, including all the known dumps in Macon, Mercer, Linn, and Howard counties. The regional office personnel also inspected 71 approved solid waste disposal areas.

In air quality, 360 air samples were collected for laboratory analyses. Personnel from the regional offices investigated 161 citizen complaints. They made routine inspections of 10 major point sources (those that emit more than 100 tons a year of a single pollutant). In 312 inspections, the regional office personnel took action to correct violations.

If the regional office staff does not receive voluntary compliance with the regulations, the case is referred to the appropriate DEQ program for enforcement by the Missouri Attorney General's office.

The regional office had its origins with the Missouri Clean Water Commission and the Missouri Division of Health. Together, these two agencies had 11 offices in different Missouri regions. After the state reorganization, these 11 offices were physically consolidated into the six DEQ regional offices.

REGIONAL OFFICES

Jefferson City Regional Office
2010 Missouri Blvd.
314/751-3241

Kansas City Regional Office
615 E. 13th St.
816/274-6675

Macon Regional Office
U.S. Highway 63 North
816/385-2129

Poplar Bluff Regional Office
946 Lester St.
314/785-9460

St. Louis Regional Office
8460 Watson Road, Suite 217
314/849-1313

Springfield Regional Office
1155 E. Cherokee St.
417/883-4033

LAND RECLAMATION PROGRAM

The DNR-sponsored "Tar Sands Bill" was signed into law by Gov. Christopher S. Bond on June 24, 1976, to become effective Aug. 13, 1976. It requires companies mining tar sands — deposits of asphalt or heavy oil in sandstone — to have a permit to mine and to meet certain requirements for reclaiming the mined areas. The deposits are primarily located in Missouri's Barton, Bates and Vernon counties.

The new law also requires each company mining coal, barite, or tar sands to submit a comprehensive water management plan explaining what provisions will be made to control erosion and runoff.

In addition to tar sands, the land reclamation program staff, which carries out the policy of the Land Reclamation Commission, regulates and controls the surface mining of coal, barite, limestone, sand, gravel and clay.

Before a mining company can surface mine for any of these minerals, it must submit a permit application to the Land Reclamation Commission. Submitted with the application must be a $50 permit fee and a $17.50 acreage fee for each permitted acre.

In 1975, the Land Reclamation Commission permitted 358 new acres for surface mining of limestone; 48 acres for sand and gravel; 84 acres for clay; 2,018 acres for coal, and 178 acres for barite.

Bonds Required

The commission also requires mining companies to post bonds. These bonds are released after staff inspection finding satisfactorily completed reclamation. The bonding level for coal and tar sands can be set not less than $300 per acre, and not more than $700 per acre. Minimum bond amount is $2,000. The bonding level for mining barite can be set at not less than $200 per acre and not more than $500 per acre. For limestone, sand, gravel, and clay, the bonding level is $500 per acre.

The "tar sands bill" was signed into law by Gov. Christopher S. Bond on June 24, becoming effective Aug. 13. At the signing ceremony were from left, Larry Gale, Missouri Department of Conservation; Bob Neuenschwander, director of staff, DNR Land Reclamation Commission; Bill Kovacic, reclamation technician, Land Reclamation Commission; Bond; Dr. George Smith, member, Land Reclamation Commission, and Ed Stegner, executive director, Conservation Federation of Missouri.

In surface mining of coal, barite, or tar sands, the law requires that at least 75 per cent of the mined area must be graded to a rolling topography which farm machinery can traverse, and then must be revegetated. If the remaining land is reclaimed for wildlife, all peaks and ridges must be leveled to a minimum width of 30 feet.

The law requires the reclamation of all lands affected by the surface mining of limestone, sand, gravel, and clay. If the land is being reclaimed for pasture, all peaks and ridges must have the overburden struck off to a minimum width of 20 feet. Mined land that is converted to cropland must have the peaks and ridges graded so that farm machinery can move over the area.

In 1975, the Land Reclamation Commission released 69 acres reclaimed from surface mining of limestone; 8 acres reclaimed from surface mining of sand and gravel, and 83 acres reclaimed from surface mining of clay.

In the mining of barite, 205 acres were released after grading and 205 acres after revegetating.

The commission also released 2,100 acres from surface mining of coal. Of the total, 1,726 had been graded; 135 revegetated; 103 converted to water impoundments; 86 acres converted to roads, and 50 permitted acres that had not been mined.

The Land Reclamation Commission's second biennial report for 1974-75 is published separately in compliance with Section 444.530, (13) Missouri Revised Statutes, 1971.

STRIP MINING IN HENRY COUNTY

DIVISION OF GEOLOGY AND LAND SURVEY

Through systematic mapping, geologic studies and land surveying, the professional staff in DNR's Division of Geology and Land Survey provides the scientific knowledge necessary for the wise management and development of Missouri's resources.

The geological survey appraises the quantity and quality of minerals, water and land resources and interprets these facts through publication of technical and scientific reports, maps microfilming and open data files.

Land survey experts develop surveying and recording standards so that Missouri's land can be accurately, permanently and economically located by its citizens.

Public awareness of Missouri's minerals, water and land resources was reflected dramatically in the distribution in FY 76 of 101,732 publications, an average of 409 technical reports, maps, educational materials and other information distributed each working day by mail or over the counter.

Information services through letters, phone calls and personal contacts were provided to almost 14,000 persons seeking maps, publications, library services, information on geologic features and other features. Nearly 70 news stories describing division programs were released via the news media to inform the public of current research and available services.

Among the general and technical reports completed in FY 76 was a comprehensive geologic assessment of St. Charles County; a guidebook to the geology and ore deposits of the Viburnum Trend, the world's largest lead-producing district; a regional appraisal of water resources in south-central Missouri, done in cooperation with the U.S. Geological Survey (USGS), plus information on minimum standards for property boundary surveys in Missouri and on the original U.S. Public Land Survey corners.

Graduate students, mining and petroleum exploration geologists and others frequently use the division's scientific library and archives which house hundreds of published and unpublished reports, maps and other technical data.

Cave investigations added 430 maps, reports and locations to the geologic features inventory files, valuable in maintaining environmental quality, planning highway construction and a host of other applications. Missouri, with 3,421 known caves — more than any other state — has a particularly important role to play in collecting and evaluating cave data.

Information also was collected, interpreted and placed on open file on vertebrate paleontology, springs and other natural features. Samples of Missouri's common rocks and minerals were furnished to schools, youth organizations and other groups, while professional staffers also talked to educational, scientific and civic groups on division activities, and prepared and distributed educational displays and other materials.

Joining Gov. Christopher S. Bond at his recent signing of the Mining Day proclamation were, from left, Dr. Wallace B. Howe, state geologist and director, DNR Division of Geology and Land Survey; Harley Monroe, Meramec Mining Co.; George Anderson, Harbison Walker Refractories Co.; Richard E. Day, Pennsylvania Glass Sand Corp.; Joe Rossier, Milchem, Inc.; Scott Brundage, Peabody Coal Co.; Governor Bond; Robert Hines, Missouri Portland Cement Co.; Harold A. Krueger, Ozark Lead Co.; Dr. Theodore Planje, University of Missouri, Rolla; Joseph C. Arundale, U.S. Bureau of Mines; Robert F. Luby, Missouri-Illinois Tractor & Equipment Co., Inc., and W. E. Marbaker II, Mining Industry Council of Missouri.

GEOLOGICAL SURVEY PROGRAM

Because geology is more than the academic study of ancient fossils and rocks, the 26 staff geologists assigned to the geological survey program were involved in locating minerals and water supplies. They were also helpful in planning use of land resources through evaluation of sites for construction, waste disposal and other purposes.

Mineral Resources Data and Research Section

Geologists and representatives of the mineral industries have warned about probable mineral shortages for years, but such warnings went largely unheeded until the 1973 oil embargo and resultant concern about energy. Now there is new interest in Missouri coal and other energy resources which has sparked research efforts to assess their potential for meeting the state's energy needs.

Top priority was given to reevaluating Missouri's coal reserves and doing special studies and analyses of trace elements in samples from coal beds being mined and from ash coal-fired electric generating plants. Existing coal information was collected and provided to put into a computerized National Coal Data System.

Continuing research in the geology of minerals and mineral fuels provided new knowledge of the factors that control the occurrences of these resources. Targets for exploration and technological research were identified. Information about known and potential resources was provided to developers, industry, individuals and others through letters and field visits.

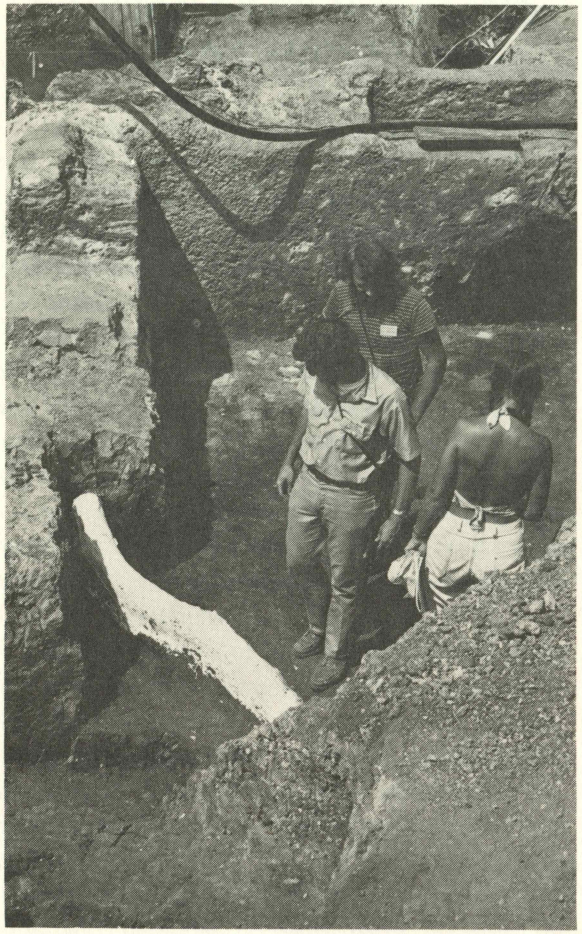
Missouri's 1975 mineral production value was the second highest on record. The $672.3 million production was only 2.7 per cent under 1974's all-time $691 million record. Experts linked the slight decrease to an economic recession which reduced prices and the demand for lead, zinc and copper. Based on 1975 figures, Missouri ranked first in the nation in lead production; second in barite; third in zinc; fourth in lime and stone; fifth in cement; sixth in silver, and seventh in copper.

The geology and ore deposits of Missouri's Viburnum Trend were emphasized in a symposium in October 1975 co-sponsored by the division, the Society of Economic Geologists, and mining companies active in Missouri.

Work now is being directed toward reevaluating and assessing Missouri's mineral resource base. Goals include publication next year of a new Mineral Resources and Industry Map of Missouri to include energy-related facilities, and an analysis of land-use requirements by the state's mineral industry to be partially based on an inventory of surface-mined lands in Missouri scheduled for completion next year.

Results of recent investigations of Missouri's mineral-rich Precambrian rocks were readied for publication as a part of a 200-page illustrated guide to the St. Francois Mountains of Missouri.

LANDSAT — 2 multispectral images were evaluated and related to known geological structures, mineral deposits and other patterns as a guide to better understanding of their origins and development. Aerial photography and other remote sensing techniques were also of value in these studies. A 5-year multi-state report on seismic risk analysis of the New Madrid region is in the planning stage.



Tusk of an Ice Age mastodon lies encased in plaster prior to removal from Jones Spring excavation near Fristoe, Mo., in Hickory County. Geologists who are members of Friends of the Pleistocene reviewed the excavation on tour of Pomme de Terre River Valley in mid-August. DNR geologists drilled wells and directed pumping operations for scientists to excavate the site.

Water Resources Data and Research Section

An assessment was completed of the water resources in the Springfield area. Hydrologic analyses continued in the Dry Auglaize and Niangua River basins and in the Mississippi Embayment area in cooperation with the USGS. An inventory and analysis of Missouri's groundwater was begun based on groundwater levels measured by a statewide network of automatic recorders in observation wells throughout Missouri.

Stream-gaging stations and more than 40 groundwater observation wells provided data on the flow and volume of water in Missouri's streams and aquifers.

In the planning stages are an assessment of water resources availability for energy development in a portion of the Missouri River Valley, with the USGS; a study of water supply for agriculture in Missouri in cooperation with other agencies, and water resources availability as a factor in land use in Missouri. Another major study of the hydrology of the Ozarks region in Missouri probably will be completed as a series of reports in cooperation with the USGS.

Applied Engineering and Urban Geology Section

As an aid in preventing environmental degradation and economic loss, staff geologists routinely examined sites to determine their geologic suitability for lakes, waste disposal and other purposes — a service without charge. Of more than 830 sites field-checked, slightly more than half involved sewage lagoons, landfills, septic tanks or other waste disposal facilities. The 318 lake-site investigations marked a 30 per cent increase over FY 75.

The remaining field efforts were geologic evaluations of surface stability of soil and bedrock in areas subject to sinkholes. Nearly 100 sudden collapses of the earth's surface have been documented in Missouri by staff geologists since the 1930s.Data on catastrophic collapse and subsidence in the state were included in the division's open data files for public use.

Completion of a Resource and Land Inventory (RALI) project in cooperation with the USGS provided a basis for comparing the reliability of maps used to evaluate soil and bedrock. More precise methods for evaluating waste disposal sites also were devised during the RALI study.

Studies on the engineering properties of soil and bedrock and their relationship to waste disposal, water impoundments and construction were made in St. Charles County and Greene County. The findings were put in comprehensive geologic reports to be published in FY 77. Investigations also were made on causes of catastrophic land surface collapses (sinkholes).

Areal Geology and Stratigraphy Section

An important project in FY 76 was the continuation of the long-term effort by the staff to revise the Geologic Map of Missouri. This large, multi-color map will show the distribution of rock formations immediately beneath the soil throughout the state, essential in mineral exploration and development.

Investigations of Missouri's surficial materials or deposits continued as a basis for a large map to show distribution and thickness of soil and loose rock material to be of value in land use, waste disposal and construction planning.

A guide to the geology along Interstate 55 from St. Louis through Missouri's Bootheel region neared completion for publication in FY 77, and is expected to be of special popular interest. The highway cuts across a rock formation of unusual geologic interest and the Mississippi Embayment — one of the state's prime agricultural areas.

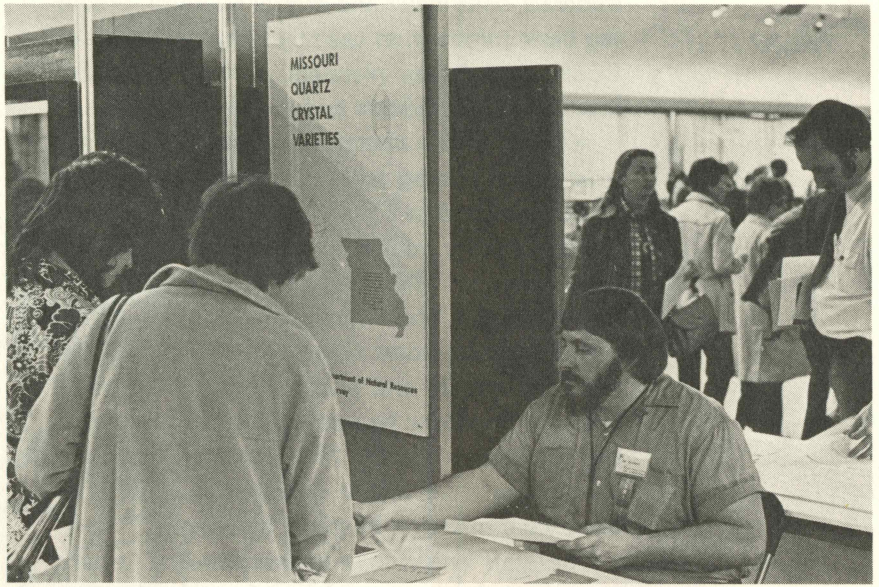
Subsurface Geology — Oil and Gas Section

Most of the information on geology and rock below the earth's surface used by the division, water well drillers, exploration geologists and many others comes from the insoluble residue well log files in this section. This widely recognized data source is used for studies of mineral fuels and economic mineral evaluations, waste disposal problems, public and private water supply studies, pollution abatement, and academic purposes.

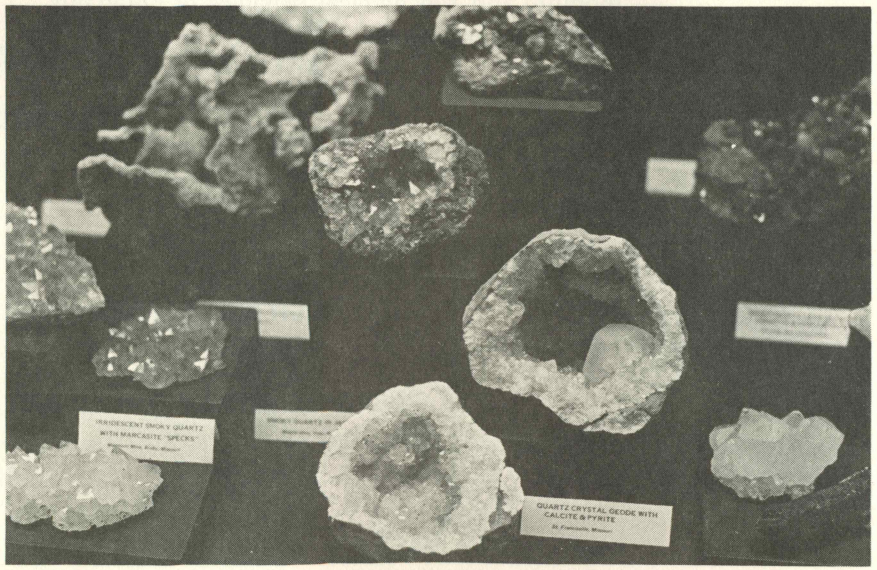
A large number of well logs and drill cores from mineral-rich southeastern Missouri were released from confidential status in April 1976. The logs and cores were made available for the division's open geologic data files by the New Jersey Zinc Co. The logs and cores yield vast quantities of information which would be prohibitively expensive for a state agency to duplicate because of the high cost of drilling. The persistent geologic exploration of and guided by study of well logs and drill cores was the direct result of a discovery of a completely new series of mineral deposits in the Viburnum Trend in the mid-fifties.

The oil and gas section staff presented several talks and technical papers in FY 76 on the heavy oil deposits in western and northwestern Missouri. Federal grants from the Energy Research and Development Administration and the USGS enabled them to continue studying these potentially valuable deposits. Investigations involved drilling in conjunction with electric or radiation logging and core analysis.

Staff geologists were helpful to the State Oil and Gas Council, a policy-making body of the department, by providing staff and field assistance and revising Oil and Gas Council rules and regulations to meet new requirements. They also kept the council members up to date on federal Environmental Protection Agency and Federal Energy Administration related activities, and maintained the division's liaison with various committees, federal agencies, data collecting organizations and mineral-fuel oriented professional societies.



Art Hebrank, DNR Division of Geology and Land Survey answers questions about Missouri geology at the 16th annual Gem and Mineral Show March 12-14 in Kansas City.



Geochemistry Section

Geochemists studied the distribution and amounts of the chemical elements in rocks, minerals, soils water and ores of Missouri, providing basic information used by industry, health officials, consultants, planners, university and college faculties, students and the general public.

A study of the chemical composition of coals from active mining areas in Missouri is expected to be published in FY 77.

Forty to fifty million tons of stone are quarried each year in Missouri for cement and lime manufacturing, construction aggregate, aglime and dimension stone. Geochemists helped determine the quality and possible harmful effects of Missouri limestone by semi-quantitatively analyzing for approximately 20 trace elements. Last year, more than 3,000 quantitative determinations were made on Missouri limestones.

The staff analyzed both surface and ground water to help monitor changes in water quality and provide data for investigations under way in the Missouri Bootheel, the Niangua River basin and the Springfield area. In addition, leachates from landfills were monitored to determine the mobility and geochemical behavior of pollutants from waste discharges.

LAND SURVEY PROGRAM

The professional staff assisted the public as well as surveyors in solving problems concerning land throughout Missouri.They worked to restore the original U.S. Public Land Survey corners that provide basic boundary control for all real property in the state, and to extend a horizontal control network that would permit use of the Missouri State Coordinate System. Advisory regulations were issued periodically to assure uniform and professional surveying in the state.

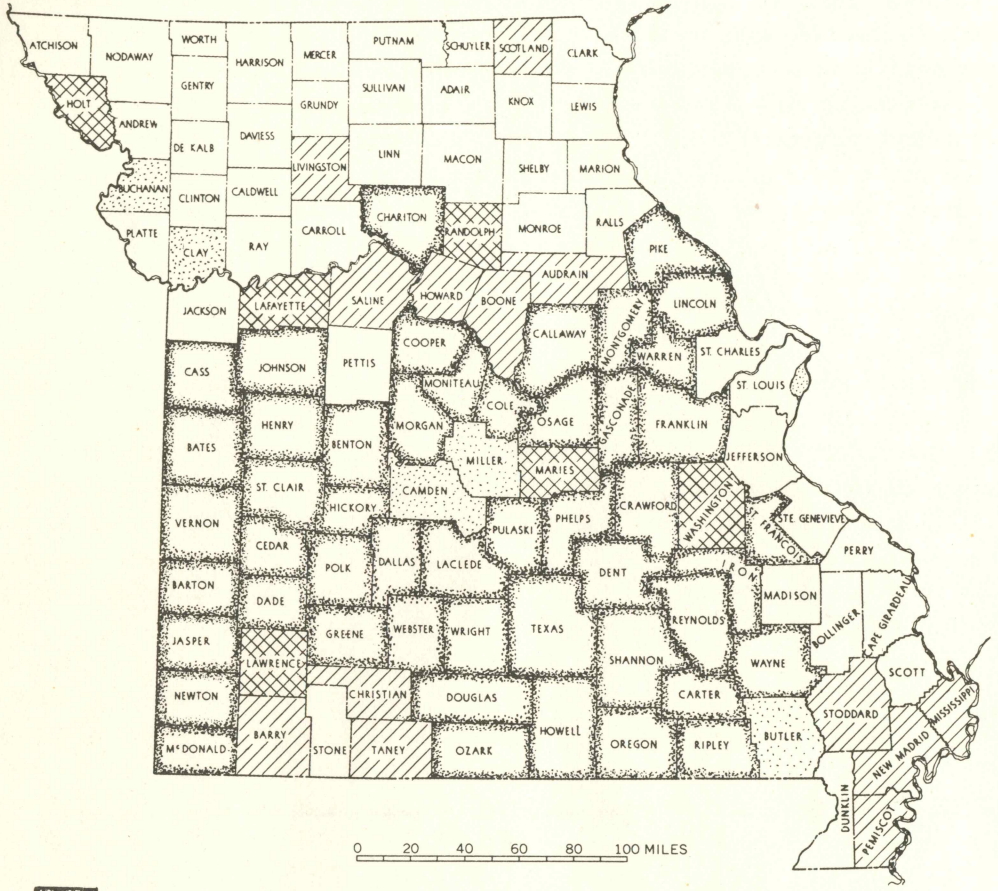
The general administrative services of the program included development of computer programs, survey contract administration, development of surveying and recording standards, and project investigations and development.

The staff, under a cooperative program, encouraged local registered surveyors to submit qualified corners for monumentation by the land survey and promote use of the Missouri State Coordinate System.

Field inspections and surveys were made to insure compliance with regulations designed to help preserve land and geodetic survey marks in the state. In FY 76 there were 244 section and 1/4 corners remonumented. Now, 6,032 of these corners are on record with the land survey program.

The Land Survey Records Repository, first microfilm repository of its kind in the nation, has been a model for similar operations in other states. A total of 301,440 documents are currently filed there.

Land survey records from 67 counties have been collected into a single unitized system and stored on microfilm in the division's modern repository. During FY 76, 93,751 surveys were indexed on a computerized system for easy retrieval. The repository provided archival storage of survey documents in one location as an aid to qualified land surveyors and others.



COUNTY PRESENTED MICROFILM AND INDEXED

RECORDS FILMED (NOT INDEXED)

INDEXED & FILMED (WAITING ON EDITING AND COMPUTER RUN)

RECORDS FILMED AND INDEXED (GENERALLY NOT COUNTY RECORDS)

Missouri Dept. of Natural Resources
P.O. Box 176
Jefferson City, Mo. 65101